LOWER YUBA RIVER PILOT GRAVEL INJECTION PROJECT
YUBA AND NEVADA COUNTIES, CALIFORNIA

DRAFT ENVIRONMENTAL ASSESSMENT
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US Army Corps
of Engineers ®
Sacramento District

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Finding of No Significant Impact
Lower Yuba River Pilot Gravel Injection Project
Yuba and Nevada Counties, California

The U.S. Army Corps of Engineers, Sacramento District, has determined that implementing the pilot gravel injection project on the lower Yuba River, immediately below Harry L. Englebright Dam and Reservoir, would have no significant effects on the quality of the human environment. The project area is located in the steep lower Yuba River canyon off Highway 20, about 23 miles east of Marysville, California. Project activities would include placing approximately 500 tons of a heterogeneous mix of gravel and cobble directly into the lower Yuba River channel below Englebright Dam using a belt conveyor. The fate of the injected gravel would then be tracked for an improved understanding of the lower Yuba River geomorphic processes.

The proposed action would satisfy the Terms and Conditions of the incidental take statement included in the April 27, 2007, Biological Opinion prepared by National Marine Fisheries Service pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended. Knowledge gained from the study of this pilot gravel injection would allow the Corps to develop and implement a long-term gravel augmentation program. A long-term program would partially compensate for the operation of the Englebright Dam, which has greatly altered geomorphic processes and aquatic habitat conditions in the Lower Yuba River channel downstream of the dam. Implementation of a long-term program would improve the overall function of the habitat of the lower Yuba River by providing spawning gravel to key areas that have been designated as critical habitat for the Central Valley spring-run Chinook salmon and the Central Valley steelhead.

A draft Environmental Assessment (EA) was prepared to evaluate the potential effects to natural and cultural resources in the proposed project area. Based on the evaluation of potential effects described in the EA, I have determined that the proposed pilot gravel injection project would have no significant adverse effects on existing resources including special status species, fish and wildlife, vegetation, air and water quality, and cultural resources. No additional environmental documentation is required, and the project activities may proceed as proposed.

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Date

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Thomas C. Chapman, P.E.
Colonel, U.S. Army
District Engineer

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1.0 PURPOSE AND NEED FOR ACTION

1.1 Background

The lower Yuba River downstream of Harry L. Englebright Dam and Reservoir (Englebright) has experienced extensive sediment deposition as a result of the hydraulic gold mining that occurred in the watershed during the mid- to late 1800's. An estimated 685 million cubic yards of mining debris was washed out of the mountains and into the Yuba River (Hagwood 1981). As the sediment migrated downstream, the river bed rose, causing extensive flooding in the Marysville area. To control this sediment movement, the U.S. Army Corps of Engineers (Corps) constructed Daguerre Point Dam in 1906 and Englebright in 1940.

Since its construction, Englebright has continued to fulfill its primary purpose of debris control with containment of 17,750 acre-feet of sediment (Chiles 2003). The elimination of the upstream supply of sediment, however, has led to some downstream-progressing degradation of the channel below Englebright, at least as far downstream as Parks Bar where the Highway 20 bridge footings have been exposed (Mussetter Engineering, Inc. 2000). Lack of sediment input and gravel loss within this reach of Lower Yuba River have greatly reduced the availability of quality spawning gravel for the Central Valley steelhead and spring-run Chinook salmon.

Below Parks Bar, sediment sources from tributary input; gravel entrained from bars, training walls, and hill slopes; and gravel existing in the channel bed continue to provide large areas of suitable spawning habitat (Moir 2006). However, without additional gravel delivery, the existing gravel supply in the bed and usable gravel stored in bars will decrease as it is gradually transported downstream, leading to a net deficit of spawning caliber sediment.

1.2 Proposed Action

The Corps, in cooperation with the Watershed Hydrology and Geomorphology lab at University of California, Davis (UCD), and U.S. Fish and Wildlife Service under the Anadromous Fish Restoration Program, is proposing to implement a pilot gravel injection project in late September 2007 with the placement of approximately 500 tons of a heterogeneous mix of gravel and cobble (0.25 to 5.0 inches in diameter) injected directly into the lower Yuba River channel below Englebright. The injection method would use a belt conveyor with a horizontal reach capacity of at least 105 feet.

The fate of the injected gravel would be tracked for an improved understanding of the lower Yuba River geomorphic processes. Injected material would be monitored by UCD through the fall and winter of 2007 with the aid of group surveys and low aerial digital photography using a tethered 8-foot blimp system. Knowledge gained from the study of this proposed action would allow the Corps to develop and implement a long-term gravel augmentation program.

1.3 Location

The project area is located on the lower Yuba River starting at Englebright (Yuba River mile 23.9) downstream to Daguerre Point Dam (Yuba River mile 11.4), Yuba and Nevada Counties, California (Plate 1). The proposed pilot gravel injection site is located downstream of Englebright and approximately 25 feet downstream of the Narrows II hydroelectric power facility. This site is less than 1 acre and confined to the river channel located in the steep Narrows canyon off Highway 20, about 23 miles east of Marysville, California (Plate 2).

1.4 Purpose and Need for the Action

The purpose of the pilot gravel injection project is to place suitable-sized spawning gravel within the upper Narrows reach to serve as a controlled field experiment in support of a long-term gravel augmentation program for restoring geomorphic processes and aquatic habitat in the Lower Yuba River channel below Englebright. Implementation of a long-term program would serve to improve the overall function of the habitat by providing spawning gravel to key areas on the lower Yuba River that have been designated as critical habitat for the Central Valley spring-run Chinook salmon and the Central Valley steelhead.

The proposed action would satisfy the Terms and Conditions of the incidental take statement included in the April 27, 2007, Biological Opinion (BO) (15422-SWR-2006-SA00071:MET) prepared by National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). Specifically, the BO states: "the Corps, in cooperation with the UCD and the Anadromous Fish Restoration Program, shall implement the proposed pilot gravel injection project below Englebright Dam within 1 year of the issuance of this BO" (NMFS 2007).

1.5 Purpose and Scope of EA

The purpose of this Environmental Assessment (EA) is to determine whether the proposed action would result in significant effects on the environment, requiring preparation of an Environmental Impact Statement (EIS), or whether the types and significance of effects of the proposed action would support a Finding of No Significant Impact (FONSI).

This EA examines various alternatives to deliver and inject the gravel, describes the environmental resources in the project area, determines the potential effects of the preferred alternative on those resources, and proposes mitigation measures to reduce any effects to less than significant. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) to provide full disclosure of potential environmental effects.

1.6 Decision Needed

The District Engineer, the Commander of the Sacramento District of the Corps, must decide whether or not to recommend one of the gravel injection methods described in this EA for implementation as a Federal project. This EA provides the basis for a FONSI under the

NEPA. Comments received will be used in reaching a decision on whether a FONSI is appropriate or if an EIS should be prepared.

2.0 ALTERNATIVES

2.1 Alternatives Eliminated from Detailed Discussion

2.1.1 Construct Temporary Access Road

A temporary access road to the proposed gravel injection site would be constructed from the existing Narrows II powerhouse access road down to the river bank. The Narrows II access road would be extended about 250 feet to the river bank beginning roughly 25 feet downstream of the Narrows II facility. Several switch backs would descend 40 feet to the river bank. With the temporary road constructed, gravel transport trucks would deliver gravel in 20-ton increments to the river bank from a designated commercial source via public and private roads. A front-end loader would be used to place the gravel from the river bank into the river.

This alternative was eliminated from further discussion because of the potential for soil erosion directly into the river channel from excavation and fill placement for the temporary road. To minimize the after-action effects, removal of the temporary road material to a location outside of the 100-year flood zone would be required. This remedial measure would be too costly for the proposed action to proceed.

2.1.2 Helicopter Delivery

A helicopter would be used for the delivery and placement of gravel in this alternative. Past applications of spawning gravel have used helicopters for delivery in difficult to reach locations (Kimball 2003). A radio-controlled hopper would be attached by a cable to the helicopter. The hopper would be filled by a loader on the ground and flown to a designated point on the river. A radio signal would be sent to the hopper, which opens the bottom of the hopper thereby delivering the gravel. The average rate of delivery for this alternative is 20 tons per hour.

Although this alternative would not require the construction of a temporary access road within the 100-year floodplain, this alternative was eliminated from further discussion because of the hazardous combination of slow flight in close proximity to physical obstructions (Englebright Dam, steep canyon walls, and suspended electrical transmission conduit associated with the Narrows II powerhouse). In addition, the contractual cost estimates of between $1,800 per /hour and $4,500 per hour for a heavy lift capacity helicopter and operator(s) would be too costly for the proposed action to proceed.

2.2 No Action

The No-Action alternative serves as the environmental baseline against which the proposed action is compared. Under this alternative, the Corps would not implement the pilot gravel injection Project on the lower Yuba River immediately downstream of Englebright.

There are currently several projects and programs, either in the planning stages or underway on the lower Yuba River, that involve various efforts to improve conditions for anadromous fisheries. However, the existing geomorphic processes related to recruitment and transport of suitable spawning gravels below Englebright would essentially remain the same. The Corps would reinitiate consultation with NMFS by April 27, 2008, to determine the appropriate actions to be taken in the absence of a pilot gravel injection project, leading to the development and implementation of a long-term gravel augmentation program, to compensate for the interruption of recruitment gravel caused by the operation of Englebright Dam.

2.3 Pilot Gravel Injection

The preferred alternative consists of injecting 500 tons of gravel and cobble directly into the lower Yuba River channel near Narrows II powerhouse. This pilot project would be designed to provide information regarding lower Yuba River geomorphic processes. Details of staging, gravel sizes, injection, and monitoring for the alternative are provided below. Project feature locations are provided on Plate 3.

2.3.1 Staging and Stockpiling

There would be two staging areas for the project. The first staging area would be located at the gravel turnout along the paved access road to Narrows II. This area would be used primarily for vehicle parking and temporary storage of truck trailers loaded with gravel. The second staging area would be located on a gravel bench downstream and level with the top of Narrows II at the end of the access road. The belt conveyer vehicle (Plate 4), gravel-fed hopper, and other front-end loader would be operated from this bench.

The gravel delivered via haul truck from the first staging area to the second staging area bench would be temporarily stockpiled on a previously disturbed roadbed adjacent to the belt conveyer vehicle. The trucks would continue to replenish the gravel in the stockpile until the entire 500 tons of gravel have been injected into the lower Yuba River.

2.3.2 Gravel and Cobble

The Anadromous Fish Restoration Program has recommended gravel specifications to ensure that the gravels injected provide some usable spawning habitat and optimal egg survival rates for salmonids within the lower Yuba River. These specifications are shown in Table 1. This gravel would be obtained from a commercial aggregate source located within the lower Yuba River watershed.

In addition, approximately 360 uniquely identified tracer rocks would be added to the heterogeneous mix of gravel and cobble. Each tracker rock has been measured previously for mass, volume, density, size, and shape, and fitted with a powerful magnet drilled and sealed into its core to aid recovery using a magnetic locator.

Table 1. Gravel and Cobble Specifications for Salmonid Spawning and Egg Incubation

Gravel Size (inches)	Percent Retained	Target % of Total Mix
4 to 5	0 - 5	2.5
2 to 4	15 - 30	20
1 to 2	50 - 60	35
¾ to 1	60 - 75	15
½ to ¾	85 - 90	15
¼ to ½	95 - 100	10
< ¼	100	2.5

2.3.3 Gravel Injection Process

During mobilization, the belt conveyor vehicle, gravel-fed hopper, and front-end loader would be moved to the road bench staging area downstream of and level with the top of the Narrows II powerhouse. The belt conveyor vehicle would be parked so that the telescopic conveyor could be extended from the vehicle at least 105 feet horizontally over the river.

Haul trucks would deliver gravel to the belt conveyor's hopper from a commercial aggregate source within the local watershed via public and private paved roads. Each haul truck would deliver 20 tons of gravel; that is, 10 tons in the truck's trailer and 10 tons in a detachable trailer. The detachable trailer would be unhitched and parked at the turnout staging area while the haul truck delivers and stockpiles gravel adjacent to the hopper.

The front-end loader would be used to feed the gravel into the belt conveyor's hopper. In turn, the gravel-fed hopper would feed the telescopic belt conveyor, and material would drop 40 feet directly into the lower Yuba River. The empty truck would return to the detachable trailer, re-hitch, and deliver the second 10-ton load. The empty haul truck and trailer would then be driven back to the aggregate source, and the process would be repeated until 500 tons of gravel and cobble (0.25 to 5.0 inches in diameter) are delivered and injected directly into the lower Yuba River channel.

2.3.4 Work Schedule

The proposed work would be conducted over 1 or 2 weekdays in late September 2007. Work hours would be limited to 8 a.m. to 5 p.m.

2.3.5 Monitoring Program

Outflow release from the Narrows II powerhouse and spill flows over the top of Englebright would aid in transporting the injected gravel and tracer rocks downstream within the upper Narrows reach of the Lower Yuba River. Injected gravel would be monitored through the fall and winter of 2007 by the Watershed Hydrology and Geomorphology lab at UCD for entrainment and fate with the aid of low aerial digital photography using a tethered 8-foot blimp system.

Data from the monitoring program would be compared with hypothetical quantitative predictions based on the ecologic, geomorphic, and hydrodynamic conditions present at the injection site. Confirmation of predictions related to how much of the channel would be affected and how long the effect would persist, coupled with the potential beneficial qualities of the changes induced, would allow optimization of a long-term gravel augmentation program design with a more accurate cost/benefit analysis.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Environmental Resources Not Considered in Detail

Initial evaluation of the effects of the alternatives indicated that there would likely be little to no effect on several resources. These resources are discussed in Sections 3.1.1 through 3.1.8 to add to the overall understanding of the environmental setting.

3.1.1 Climate

The project area has a Mediterranean, semi-arid climate characterized by cool, moist winters and warm, dry summers. Summer temperatures average approximately 90 degrees Fahrenheit (F) during the day and 50 degrees F at night. Winter daytime temperatures average in the low 50's, and nighttime temperatures average in the upper 30's.

The temperature generally decreases and precipitation increases as the elevation rises from 120 feet above mean sea level at Daguerre Point Dam to the crest elevation of Englebright at 527 feet above mean sea level. Precipitation data have been recorded daily at Englebright for the National Weather Service since 1955 (WRCC 2005). Annual precipitation averaged over this 50-year time span is about 34.5 inches, with approximately a 40 percent chance of precipitation occurring on any given day between November 15 and March 1. Heaviest monthly rainfall periods of record include December 1955 at 17.65 inches, March 1995 at 16.60 inches, and January 1969 at 16.11 inches (WRCC 2005).

3.1.2 Geology and Seismicity

The surface of the Central Valley is composed of unconsolidated Pleistocene (2 to 3 million years ago) and Recent (10,000 year ago) sediments. The valley floor is composed of alluvial fan and channel deposits from the various rivers in the area. Adjacent to the Feather River are the most recent sedimentary rocks that overlie igneous rocks while older sedimentary rocks are located farther east. The sedimentary rocks are both marine and continental in origin (Corps, 1998).

Yuba County lies in east-central California, an area experiencing relatively low seismic activity. The nearest active fault is the Cleveland Hill Fault, located about 20 miles northeast of Marysville. This fault was the source of the 5.7-magnitude earthquake in the Oroville area in 1975. Federal and State studies after 1975 determined that the Foothills Fault system in Yuba County is a continuation of the Cleveland Hill Fault. However, the studies also

determined that seismic activity in the area is estimated to have a very long recurrence interval so special seismic zoning for the Foothills Fault system is not necessary (Corps, 1998).

3.1.3 Land Use

The Yuba County General Plan identifies the types of land use in the vicinity of the project area as public land, foothill agriculture, extractive industrial, and open space (QUAD Consultants 1994). The Corps holds fee title to approximately 165 acres of land surrounding the dam at Englebright. The proposed pilot injection site is located within the southwest component of these fee title lands below the outlet of the Narrows II powerhouse. In date??, the Corps issued Easement No. DACW05-2-75-716 to the Yuba County Water Agency (YCWA) for the Narrows II powerhouse, granting permission for the powerhouse to be constructed, operated, and maintained below Englebright (NMFS 2002).

Further downstream from Englebright and Narrows II powerhouse, land ownership in the vicinity of the lower Yuba River includes Pacific Gas and Electric Company (PG&E) and University of California, respectively, followed by private parcels and several gravel mining operations. The largest gravel extractive operation occurs in the Yuba Goldfields, located south of the Yuba River and downstream of the Highway 20 bridge and on the north bank immediately upstream of the Highway 20 Bridge. The Corps currently owns land in fee title within the Yuba Goldfields on both sides of Daguerre Point Dam (Corps 2001).

The Bureau of Land Management (BLM) owns scattered parcels adjacent to the Corps property on the south bank at Daguerre Point Dam. The BLM has proposed a land exchange in the Yuba Goldfields to provide about 6 miles of public access along the Yuba River from the Highway 20 Bridge downstream to Daguerre Point Dam (Corps 2001). A larger portion of these lands that extends downstream to the city of Marysville has been identified as the Yuba River Recreation and Wildlife Enhancement Area in the 1996 Yuba County General Plan. This area is protected from encroachments that are incompatible with recreational and wildlife uses. These uses may include activities such as camping, fishing, hiking, bike riding, equestrian use, and river rafting. The area also serves as a connection between wildlife preserves and parklands (QUAD Consultants 1994).

The proposed pilot project would not result in any changes in land use. Specifically, there would be no encroachments that are incompatible with recreational and wildlife uses.

3.1.4 Agriculture, Prime and Unique Farmland

Agriculture is still the most extensive land use in Yuba County and the most significant component of the county's economy. Approximately 68 percent of the county is used for agriculture croplands and grazing. In addition, Yuba County does not participate in the Williamson Act (California Land Conservation Act). The gross value of agricultural production in 2006 was $163.1 million (Yuba County 2007). The top five crops were rice, peaches, dried plums, cattle and calves, and walnuts.

The agricultural land in Yuba County is usually located in areas that have the potential to be prime farmland. The areas of potential prime farmland are generally located along the historic flood plains of the Yuba and Feather Rivers due to the relatively flat topography, water supply, and soil conditions. In 2006, there were approximately 270,763 acres of land in agricultural crop production in Yuba County (Yuba County 2007). Of this total, there were 41,993 acres of prime farmland, 11,019 acres of farmland of Statewide importance, and 32,372 acres of unique farmland recorded in Yuba County (CDC 2007). The type and yield of the crop determine if it is prime or unique. No prime or unique farmland has been committed to nonagricultural use during the period of 2004 through 2006. There are no soil types in vicinity of the project area that support Statewide important farmland.

The proposed pilot project is not located in the vicinity of any land designated as prime or unique farmland. No agricultural lands would be taken out of production due to the proposed pilot project.

3.1.5 Socioeconomics/Environmental Justice

The socioeconomic conditions of the project area are influenced by water diverted to farmers near Daguerre Point Dam and gravel mining in the Yuba Goldfields (ENTRIX 2004). The YCWA is the largest water rights holder on the Yuba River, with permits or licenses for over 2 million acre-feet per year (CDFGa 1991). Various water districts, irrigation districts, water companies, and individuals contract with YCWA for delivery of up to 1,550 cfs of water for irrigation and other uses. In addition to providing water for consumptive use, water is released for power generation at the Colgate powerhouse (located approximately 16 miles upstream of Englebright), at PG&E's Narrows I powerhouse (located .2 miles downstream of Englebright), and at YCWA's Narrows II powerhouse (located immediately downstream of Englebright). Hydroelectric power is generated at these locations under authorization from the Federal Energy Regulatory Commission and numerous water rights licenses issued by the State of California.

Within the project area, water diverted under YCWA's water rights permits is delivered to Browns Valley Irrigation District, Brophy Water District, South Yuba Water District, Cordua Irrigation District, Hallwood Irrigation District, Ramirez Water District, and other smaller contractors (YCWA 2002). These water districts divert Yuba River water to supply portions of their irrigation requirements from three diversions located near the downstream boundary of the project area. Browns Valley receives up to 100 cfs of pumped diversion water through the Brown's Valley Canal at the Pumpline Diversion Facility located 0.9 mile upstream of Daguerre Point Dam. Cordua, Hallwood, and Ramirez receive gravity-fed water via the Hallwood-Cordua Canal (North Canal) from the north side of the Yuba River just upstream of the north abutment of Daguerre Point Dam. Brophy and South Yuba receive gravity-fed water via the South Yuba Canal (South Canal) from the south side of the Yuba River just upstream of the south abutment of Daguerre Point Dam. Water diversion begins in April and peaks in July in association with the irrigation of rice fields. A total of 63,200 acres of land is irrigated with water from these diversions (ENTRIX 2004).

The proposed action would not affect the socioeconomic conditions in the area. The work would be limited to a small reach of the lower Yuba River well upstream of irrigation diversion points. Water conveyance to the existing three water diversions would not be affected.

3.1.6 Noise

Noise can be defined as unwanted sound, and effects are interpreted in relationship to noise level objectives for each county. The standard unit of sound measurement is the decibel. Since the human ear is not equally sensitive to sound at all frequencies, a special rating scale has been devised to relate noise to human sensitivity.

The main sources of noise at or in the vicinity of the proposed pilot gravel injection site include turbine and water discharges associated with the Narrows I and Narrows II hydroelectric facilities, and recreational activities such as boating at Englebright. The nearest sensitive receptor (residence) is more than one-half mile from the proposed action area. Noise levels are relatively low during the late night and early morning hours when ambient noise levels from recreational activities at Englebright are at a minimum. Noise levels are higher during summer daytime hours due to increased recreational boating.

The duration of construction would be a maximum of 2 days. The work hours would be 8 a.m. to 5 p.m. Occasional visitors and residents near Englebright could be aware of a temporary increase in noise levels, but any effects would not be considered to be significant. The nearest sensitive receptor (residence) is approximately one-half mile from the project site. The proposed project also would not conflict with the Yuba County General Plan Noise Element, the Yuba County Municipal Code Chapter 8.20 Noise Ordinance, or the general plan or specific plan noise elements or noise ordinances for Nevada County adjacent to the project area. Therefore, the proposed project would have no long-term adverse effects on noise levels in the project area.

3.1.7 Traffic

The gravel transport haul route begins at the intersection of State Route 20 and Peoria Road, about 14 miles east from Marysville, California (Plate 2). Road access to the proposed gravel injection site is via paved rural county roads for about 6 miles and ending with 2 miles of paved access road to the Narrows II powerhouse facility. Use of the access road is controlled by a locked gate.. The access road ends at a bench downstream of and level with the top of Narrows II. The belt conveyor vehicle would be set up on this road bench adjacent to Narrows II to inject the gravel into the river 40 feet below.

While the access road to the Narrows II powerhouse facility is closed to the public, the proposed pilot project would have temporary effects on Narrows II personnel traffic near the injection site. These effects would include increased traffic volume due to gravel transport trucks traveling to and from the injection site. However, the work would be designed so that the conveyor or gravel transport trucks would not close or block a roadway or block emergency vehicle access. Posted construction zones, reduced speed limits, and a flagman would be used

to ensure Narrows II personnel safety in the vicinity of the injection site. These safety requirements would be included in the gravel injection contract specifications.

The gravel injection contractor would also be responsible for obtaining any permits required for transportation of equipment on local highways. A California Department of Transportation (CDOT) encroachment permit would not be required as there is no encroachment within the CDOT right-of-way. As a result, there would be no significant adverse effects on traffic.

3.1.8 Esthetics

An area's visual character is determined by the variety of the existing visual features, the quality of those features, and the scope and scale of the scene. The visual components of a particular area consist of such features as landforms, vegetation, manmade structures, and land use patterns. The quality of these features depends on the relationship between them and their scale in the overall scene.

The visual character of the lower Yuba River is quite varied. The presence of a river canyon in an area which is cool and moist in the spring and hot and dry in the summer creates striking visual scenery. Rolling hills above the river are covered with green grass and wild flowers in the spring, fading to a golden brown in the summer and fall. Oak trees are seen on the hillsides, and above them, the ever-present turkey vultures glide circles in the sky on updrafts generated by the sun's interplay on the topography.

Englebright, marking the uppermost boundary of the project area, has its own esthetic values. There could be few manmade works found in the foothills of the Sierras that are as awe-inspiring as Englebright Dam. This is especially true during the spring months when the Yuba River, swollen by melting snows, sends freshets down its canyons to combine and cascade 260 feet over the brink of the dam. The resultant mist from this massive artificial waterfall rises from the canyon through the green oaks and foothill pine to create a breathtaking display (Hagwood 1981).

The proposed action site is located in the vicinity of the Narrows II hydropower generating facility. The proposed action would also occur over 1 to 2 days concurrent with construction activities related to the Narrows II bypass installation. Although the proposed action would add to a temporary disruption of the visual setting along the lower Yuba River, it would have no significant or long-term adverse effects on the visual resources in the area.

3.1.9 Vegetation and Wildlife

The major vegetation types surrounding the project area include grassland, blue oak woodland, open gray pine woodland, and chaparral. Some of the dominant species include interior live oak, blue oak, gray pine , buttonbrush , blackberry , poison oak , wild oat, foxtail, and ripgut brome. The lower Yuba River channel within the Narrows Gorge is mostly devoid of vegetation. Small isolated clumps of shining willow, mulefat, and other riparian species are

widely scattered along the otherwise barren rocky banks at the proposed pilot gravel injection site and for approximately 2 miles downstream within the Narrows Reach.

Downstream of the Narrows Reach, past gold and gravel mining operations have left extensive piles of cobble and gravel, significantly reducing the quality and quantity of vegetation types within the Garcia Gravel Pit Reach. The dominant vegetation species along the flood plain consist of narrow strips of Fremont cottonwood, sandbar willow, red willow, and box elder. Individual elderberry plants may attain small tree stature in the vicinity of Daguerre Point Dam.

The riparian and adjacent upland oak/grassland habitat along the lower Yuba River supports a variety of wildlife species. Mammals which may be found within the project area include the California blacktail deer, western gray squirrel, black-tailed jackrabbit, California ground squirrel, grey fox, mountain lion, bobcat, coyote, spotted skunk, striped skunk, raccoon, long-tailed weasel, beaver, muskrat, river otter, Botta's pocket gopher, western harvest mouse , and numerous bats.

Bird surveys conducted between June and August 1999 by a Corps biologist included observations of California valley quail, mourning dove, scrub jay, mallard, Anna's hummingbird, American crow, turkey vulture , tree swallow, killdeer, belted kingfisher, and downy woodpecker (Corps 2001).

Reptiles and amphibians that are known to inhabit the project area include the western pond turtle, common garter snake, Pacific gopher snake, western rattlesnake, western fence lizard, western whiptail lizard, western skink, horned lizard, western aquatic garter snake, California kingsnake , Pacific tree frog, and bullfrog.

The proposed project action would have no significant adverse effect on vegetation or wildlife because of the limited scope and duration of the action, and the lack of riparian vegetation in the vicinity of the proposed gravel injection site. The proposed action would not involve removal of any existing riparian or upland oak/grassland habitat. Gravel would be injected directly into the river channel. Any displaced wildlife would be expected to return to the area after the action is completed.

3.2 Soils, Topography, and Geomorphology

3.2.1 Existing Conditions

The existing sedimentological and morphological characteristics of the lower Yuba River within the project area are the direct results of historical hydraulic and dredge mining for gold that continued into the 1940's, and subsequent attempts to mitigate the catastrophic sedimentation produced from these activities with the construction of Englebright and Daguerre Point Dams (Mussetter Engineering, Inc. 2000). The project area itself is confined to that portion of the lower Yuba River between Englebright and Daguerre Point Dam. Based on relatively large differences in geology, topography, gradient, and channel morphology (Beak

Consultants, Inc. 1989), the project area may be divided into two distinct reaches: Narrows Reach and Garcia Gravel Pit Reach.

Narrows Reach. The Narrows Reach extends from Englebright to the downstream terminus of a sheer rock gorge called the Narrows (River Mile 23.9 to River Mile 21.9). Within this reach, the first 0.7 mile to the mouth of Deer Creek is characterized by steep rock walls, long deep pools, and short rapids. Outflow from Narrows II powerhouse enters the Narrows II pool, which is connected to a smaller downstream pool through a deep run. Pool depths are more than 12 feet, and the run's depth is generally more than 4 feet. Major topographical relief on the south bank of the channel causes depths to increase rapidly along the margin while relief on the north bank is less pronounced with a more gradual character. Below this area, the river cuts 1.3 miles through the Narrows Gorge. The Narrows contains a single large, deep, boulder-strewn pool with an average bed slope of 14.78 feet per mile (ENTRIX 2004).

Englebright has eliminated the upstream supply of sediment and led to some downstream-progressing degradation of the channel, at least as far downstream as Parks Bar (Mussetter Engineering, Inc. 2000). The lack of sediment supply, coupled with the hydraulic capacity of the high flow regime to transport coarse sediment through the steep, confined bedrock channel, has effectively flushed pre-dam bed load material farther downstream. The resulting channel substrate found below Englebright is mostly bedrock.

Garcia Gravel Pit Reach. The Garcia Gravel Pit Reach extends from the Narrows Reach downstream to Daguerre Point Dam (River Mile 21.9 to River Mile 11.5). It is here that the lower Yuba River canyon opens into a wide alluvial floodplain where large volumes of hydraulic mining debris known as the Yuba Goldfields remain from past gold mining operations. The river descends an average of 9.0 feet per mile to Daguerre Point Dam, the southwestern boundary of the project area.

Daguerre Point Dam was constructed to trap hydraulic mining sediment. Accumulated sediment from in-filling upstream of the dam has formed a sediment wedge that extends about 2.7 miles upstream. The slope of the streambed is nearly zero for 1 mile upstream of Daguerre Point Dam (ENTRIX 2004). The predominant rock formation in the vicinity consists of meta-volcanic greenstone (Corps 2001). The predominant soil type is the Redding-Corning series, which consists of a reddish-yellow gravelly surface overlying the reddish clay subsoil (Corps 2001).

The current and historic lower Yuba River channel contains water-worn pebbles, cobbles, and boulders. For about 4 miles upstream of Daguerre Point Dam, the south bank is composed of dredge spoils from the Yuba Goldfields, and the north bank is predominantly composed of the River bank Formation, which is a highly resistant hard complex of red sand, silt, gravel and small cobble from the Pleistocene.

Qualitative observations of streambed sediments upstream of Daguerre Point Dam were made by ENTRIX in September 2002. These observations concluded that a tremendous volume of suitable spawning size gravel is stored in steeply-sloped gravel bars on the sides of

the channel within this reach (ENTRIX 2004). The lower Yuba River has incised into many of the gravel bars creating a hydraulically efficient channel with low flow widths, high flow depths, and high flow velocities (ENTRIX 2004). These hydraulic conditions combined with sediment-free water released from the Narrows II powerhouse below Englebright enable the river to effectively transport what gravel is available downstream and form a coarse armor layer on the bed. Through selective erosion, coarse sediment remains on the bed and shields the underlying fine sediment from erosion and transport. This layer likely mobilizes during periodic large floods.

Although the large gravel bars may constrain the available habitat during spawning periods, they also partially serve as a source for gravel recruitment. Recent geomorphological studies by UCD (Moir 2006) has shown that this reach experiences frequent episodes of morphological adjustment as a consequence of the plentiful local sediment supply and a near-natural flood hydrology that significantly influences patterns of salmonid habitat utilization between spawning seasons. Differencing of the pre- and post-flood site topographies and hydraulic model outputs reveals that scour in the upstream pool-tail section of Garcia Gravel Pit reach study sites resulted in aggradation of the side channel and fining of the downstream channel margins, improving habitat conditions and increasing spawning frequency in these locations.

Both ENTRIX and UCD studies indicate that, although the distribution and frequency of salmonid spawning activity may be positively influenced by flood-induced morphological changes in the lower Yuba River channel, the process is not presently self-sustainable. The channel will continue to incise and the bed further armor. In addition, without additional gravel delivery to the channel, the existing gravel supply in the bed and usable gravel stored in bars will decrease as it is gradually transported downstream out of the project area, leading to a reduction in spawning habitat (ENTRIX 2004).

3.2.2 Effects

Basis of Significance. Sediment budgets provide a record of relative channel stability and thus a means of assessing physical habitat change (Merz et al. 2006). An alternative would be considered to have a significant effect on geomorphology if river channel discharge and sediment load rates are substantially altered.

No Action. Under this alternative, the geomorphologic conditions in the project area would remain the same. The river channel through the Narrows Reach would continue to be deprived of adequate gravel recruitment due to the existence of Englebright Dam.

Pilot Gravel Injection. A potential short-term localized effect to the geomorphologic process would be expected in response to the gravel injection. The geomorphic stability of the river would reach dynamic equilibrium with the redistribution of injected gravel into hydraulically shielded areas that allow coarse sediment deposition. Because the proposed injection site is within a hydraulically efficient stretch of lower Yuba River, deposition in the shallower run section would be limited to micro-eddies behind immobile boulders. A majority of the gravel would likely eventually be flushed from the area under high flows into the

Narrows Pool – a deep in-channel pool downstream of the proposed injection site. Gravel injected immediately downstream of Englebright may provide disproportionately important spawning habitat that results in a net benefit to production within the entire lower Yuba River.

3.2.3 Mitigation

Gravel would be obtained from a local commercial aggregate source. Gravel deliveries would be stockpiled on a previously disturbed roadbed adjacent to the hopper for loading with a front-end loader and injected directly into the river channel. No equipment would enter or access the river channel or bank. A Corps biologist would be onsite during the gravel injection, and the YCWA and downstream water districts would be notified of potential turbidity increases during the gravel injection process.

Since there would be no significant adverse effects to soils or geomorphology, no mitigation would be required.

3.3 Hydrology and Water Quality

3.3.1 Existing Conditions

Hydrology. The Yuba River watershed drains approximately 1,300 square miles on the western slope of the Sierra Nevada from a maximum height of 9,100 feet at Mt. Lola to 30 feet at the Yuba River's confluence with the Feather River at Marysville, California. The lower Yuba River extends approximately 24 miles from Englebright (at elevation 282 feet) to its confluence with the Feather River. Much of the watershed is controlled by several reservoirs that store water and trap sediments to varying degrees. These include Englebright, New Bullards Bar Reservoir located approximately 16 miles upstream of Englebright, and Daguerre Point Dam located 12.5 miles downstream of Englebright. The total storage capacity of the watershed is 1,377,000 acre-feet.

The flow in the Yuba River is partially controlled by New Bullards Bar Reservoir, the largest reservoir in the watershed, constructed by the YCWA in 1969. The YCWA stores water in New Bullards Bar Reservoir for release through the New Colgate powerhouse to provide for instream flows for fishery enhancement, flood control, power generation, and recreation, and to provide irrigation water to member units that have water rights and water service contracts. The YCWA has also supplied water from New Bullards Bar Reservoir for municipal, industrial, and fish and wildlife purposes through a number of temporary water transfers lasting less than a year. Except for New Bullards Bar Reservoir, there is only minimal storage for retention of snowmelt within the basin. Hence, much of the spring and early summer flow to the lower Yuba River is the result of uncontrolled snowmelt within the basin. In the summer and early fall, prior to the precipitation season, most of the flow in the lower Yuba River is regulated by releases from New Bullards Bar Reservoir.

Englebright Dam, marking the upstream boundary for the project area, is downstream of New Bullards Bar Reservoir. PG&E constructed the Narrows I powerhouse approximately one-fourth mile below Englebright Dam. The YCWA constructed the Narrows II powerhouse

immediately below Englebright Dam as part of its Yuba River Development Project. The coupled operation of New Bullards Bar and Englebright includes releases through the New Colgate, Narrows I, and Narrows II powerhouses, thus providing the principal regulation of the lower Yuba River.

Water that is released from New Bullards Bar Reservoir generally passes through Englebright Reservoir without modifying Englebright Reservoir elevations. Most of the lower Yuba River flow downstream of Englebright is release as outflow from hydroelectric power generation. Consequently, the 0.2 mile of river between Englebright and the Narrows II hydroelectric facility normally has standing water, except when Englebright is spilling (CDFG 1991a).

Yuba River flows are measured at Smartville near Englebright Dam at the upper end of the lower Yuba River (Smartville Gage – U.S. Geological Survey [USGS] Station No. 11418000) and at Marysville, about 6 miles upstream of the mouth of the Yuba River (Marysville Gage – USGS Station No. 11421500). Data from the Yuba River's Smartville gaging station indicate that flows average 2,600 cfs annually, with the highest flows in February and March.

In 1986, the Corps developed a 100-year flood simulation model for the Yuba River to evaluate the effects of such an event. This model produced various flow and stage relationships at various points along the Yuba River. The flows modeled by the Corps ranged from 5,000 cfs to a 100-year event of 135,000 cfs (CDWR 1999). The data obtained from the Corps flood model and yearly average flow from the Smartville gaging stations were also used to estimate flow event probabilities. These estimates are shown below in Table 2.

Table 2. Estimated Flow Event Probabilities

Event	Flow (cfs)
1 in 10 years	23,000
1 in 25 years	51,000
1 in 50 years	85,000
1 in 75 years	114,000
1 in 100 years	135,000

The Federal Power Act sets forth minimum instream flow requirements on the lower Yuba River. On March 1, 2006, the YCWA began to provide instream flow in accordance to the 2007 Pilot Program Fisheries Agreement through March 31, 2008. Except as otherwise stated in the 2007 Pilot Program Fisheries Agreement, YCWA would comply with the flow schedule requirements shown in Table 3 during the period of the proposed project. Schedules 1-6 specify minimum instream flow requirements measured at the Marysville Gage based on the North Yuba Index (water year hydrologic classification). Schedules A and B shown in Table 4 specify minimum instream flow requirements at the Smartville Gage.

Water Quality. State law defines beneficial uses of California's waters as uses that may be protected against quality degradation. As defined by the Central Valley Region of the

California Regional Water Quality Control Board (CRWQCB), waters below Englebright Dam support numerous beneficial uses including irrigation, power generation, recreation, cold and warm freshwater habitat for resident fishes, and cold and warm freshwater migration and spawning habitat for anadromous fishes (CRWQCB 1998).

The overall water quality of the lower Yuba River is good and has improved in recent decades due to controls on hydraulic and dredge mining operations, and the establishment of minimum instream flows (Beak Consultants, Inc. 1989). Several factors that influence water

Table 3. Lower Yuba River Minimum Instream Flows (cfs) for Schedules 1 through 6, Measured at the Marysville Gage

Schedule [a]	Oct 1-31	Nov 1-30	Dec 1-31	Jan 1-31	Feb 1-29	Mar 1-31	Apr 1-15	Apr 16-30	May 1-15	May 16-31	Jun 1-15	Jun 16-30	Jul 1-31	Aug 1-31	Sep 1-30
1	500	500	500	500	500	700	1,000	1,000	2,000	2,000	1,500	1500	700	600	500
2	500	500	500	500	500	700	700	800	1,000	1,000	800	500	500	500	500
3	500	500	500	500	500	500	700	700	900	900	500	500	500	500	500
4	400	500	500	500	500	500	600	900	900	600	400	400	400	400	400
5	400	500	500	500	500	500	500	600	600	400	400	400	400	400	400
6 [b, c]	350	350	350	350	350	350	350	500	500	400	300	150	150	150	350

TAF = total acre-feet

cfs = cubic feet per second

[a] Schedule 1 years are years with the North Yuba Index (NYI) ≥ 1,400 TAF, Schedule 2 are years with NYI 1,040 to 1,399 TAF, Schedule 3 are years with NYI 920 to 1,039 TAF, Schedule 4 are years with NYI 820 to 919 TAF, Schedule 5 are years with NYI 693 to 819 TAF, Schedule 6 are years with NYI 500 to 692 TAF, and Conference Years are years with NYI < 500 TAF.

[b] Indicated flows represent the average flow rate at the Marysville Gage for the specified time periods listed above. Actual flows may vary from the indicated flows according to established criteria.

[c] Indicated Schedule 6 flows do not include an additional 30 TAF available from groundwater substitution to be allocated according to the criteria established in the Fisheries Agreement.

Table 4. Lower Yuba River Minimum Instream Flows (cfs) for Schedules A and B, Measured at the Smartville Gage

Schedule	Oct 1-31	Nov 1-30	Dec 1-31	Jan 1-31	Feb 1-29	Mar 1-31	Apr 1-15	Apr 16-30	May 1-15	May 16-31	Jun 1-15	Jun 16-30	Jul 1-31	Aug 1-31	Sep 1-30
A[a]	700	700	700	700	700	700	700	[c]	[c]	[c]	[c]	[c]	[c]	[c]	700
B[b]	600	600	550	550	550	550	600	[c]	[c]	[c]	[c]	[c]	[c]	[c]	500

cfs = cubic feet per second

[a] Schedule A flows are to be used concurrently with Schedules 1, 2, 3, and 4 at Marysville.

[b] Schedule B flows are to be used concurrently with Schedules 5 and 6 at Marysville.

[c] During the summer months, flow requirements at the downstream Marysville Gage always will control; thus, Schedule A and Schedule B flows were not developed for the May through August period. Flows at the Smartville Gage will equal or exceed flows at Marysville.

quality in the river include rainfall and runoff patterns, quality of the irrigation water supply, crop acreages, crop cultural practices (pesticide and herbicide use), water management, and soil characteristics.

Dissolved oxygen concentrations, total dissolved solids, pH, hardness, alkalinity, and turbidity are well within acceptable or preferred ranges for salmonids and other key freshwater organisms. The minimum, maximum, and average levels of pH, turbidity, dissolved oxygen, total organic carbon, nitrogen, phosphorus, and electrical conductivity for the lower Yuba River are presented in Table 5. The data (27 samples) were collected on the Yuba River near Marysville over a 3-year period (1996 – 1998) (USGS 2002a, 2002b).

As required under CFR 40, Part 230, Section 404(b)(1) of the Clean Water Act, a Section 404(b)(1) analysis was performed to determine the potential for adverse effects on the lower Yuba River aquatic ecosystem posed by the specific dredged or fill material discharge activities associated with the proposed pilot gravel injection (Appendix A). Under consideration were the potential short- and long-term effects of the proposed pilot gravel injection on the physical, chemical, and biological components of the aquatic environment.

Discharges into waters of the U.S. that require a Federal permit or license also require certification in accordance with Section 401 of the Clean Water Act from the CRWQCB. The certification is necessary to ensure that the discharge would comply with the State's water quality standards that protect the beneficial uses of California's waters against quality degradation.

Table 5. Water Quality of the lower Yuba River near Marysville, CA

Parameter	Minimum	Maximum	Average
pH (standard units)	7.0	7.8	7.5
Turbidity (mg/L)	1	153	30
Dissolved Oxygen (mg/L)	8.0	12.4	11.4
Total Organic Carbon (mg/L)	0.7	2.4	1.1
Nitrogen (mg/L)	0.05	0.14	0.07
Phosphorus (mg/L)	0.01	0.02	0.01
Electrical Conductivity (µS/cm)	44	105	73

mg/L = milligrams per liter
µS/cm = microsiemens per centimeter

3.3.2 Effects

Basis of Significance. Current operations at Englebright impairs the timing, frequency, duration, and quantity of water flowing downstream of the dam. An alternative would be considered to have a significant effect on hydrology if the action would alter local or regional

existing flow patterns sufficient to introduce unintended substrate scour or deposition, mobilize local sediments, or substantially increase turbidity levels.

An alternative would be considered to have a significant effect on water quality if it would substantially degrade water quality, contaminate a public water supply, substantially degrade or deplete groundwater resources or interfere with groundwater recharge, or expose sensitive species or humans to substantial pollutant concentrations.

No Action. Under this alternative, water resources and quality would remain the same at Englebright Lake and the lower Yuba River. The water quality in the lower Yuba River is expected to remain of good quality. Fresh water (surface and ground) would continue to be used for agricultural, recreational, and domestic purposes.

Pilot Gravel Injection. Approximately 500 tons of a heterogeneous mix of gravel and cobble (0.25 to 5.0 inches in diameter) would be injected directly into the lower Yuba River channel at the proposed injection site (less than 1 acre) over a maximum period of 2 days. No ground-breaking activities are associated with this project. No mechanized equipment would be entering the channel or operating within the 100-year floodplain.

The placement of this gravel within the channel would increase the amount of suspended sediment and thus turbidity in the immediate vicinity of the injection site and for an unknown distance downstream. The proposed injection site is located within a hydraulically efficient stretch of the lower Yuba River. Therefore, the source of any increased turbidity would be attributed to the introduction of sediment particles adhering to the injected gravel and not from sediments disturbed and suspended from the channel bottom and sides. Turbidity associated with the proposed project activities would not exceed the CRWQCB objectives for turbidity in the Sacramento River Basin. Turbidity would not increase more than 20 percent above naturally occurring background levels, except if greater levels are defined within dilution zones via Section 401 Water Quality Certification from the CRWQCB.

The Smartville USGS Stream Gage would be adversely affected if high flows flush injected gravel downstream en mass, causing stream gage inaccuracies as a result of coarse sediment deposition near the gage. This would that require stream gage rating work be performed.

3.3.1 Mitigation

The findings of the Section 404(b)(1) analysis determined compliance with the requirements of the guidelines specified under CFR 40, Part 230, Section 404(b)(1) of the Clean Water Act, with the inclusion of appropriate and practicable discharge conditions to minimize pollution or adverse effects to the affected aquatic ecosystem. Given the limited duration and timing of the activity, as well as minimal area of effects, the appropriate and practicable conditions include the requirement that the gravel arrive screened and pre-washed to the injection site from the commercial aggregate source.

The YCWA and downstream water districts would be notified of potential short-term turbidity increases during the gravel injection activity and potential stream gage inaccuracies until the geomorphic stability of the river is allowed to reach dynamic equilibrium. Standard pollution prevention measures including erosion and sediment control measures, proper control of non-stormwater discharges, and hazardous spill prevention and response measures would be implemented, as necessary, by the contractor during the gravel injection.

Since there would be no significant adverse effects on hydrology or water quality, no additional mitigation would be required. The Corps is seeking Section 401 Water Quality Certification from the CRWQCB to proceed with the project (Appendix B).

3.4 Hazardous, Toxic, and Radiological Waste

3.4.1 Existing Conditions

The Narrows II hydropower facility is located near the proposed gravel injection site. Corps personnel inspected the site on August 21, 2006, and found no indication of existing or past sources of hazardous, toxic, or radiological waste (HTRW) in the vicinity. In addition, NMFS analyzed the effects of a proposal to install a full-flow bypass structure associated with the facility on November 4, 2005. No existing HTRW were identified (NMFS 2005b).

The remainder of the project area is located in a rural setting where adjacent land uses are primarily open space, agriculture, and recreation. As such, very few potential sources of HTRW exist. One known exception is the presence of mercury in sediments above Daguerre Point Dam. Mercury was used in the mining process to assist in gold recovery during the mid- to late 1800's. Hydraulic mining operations released the mercury along with millions of cubic yards of sediment into the Yuba River.

Mercury is transported by erosion and runoff in the elemental form, in the dissolved form, adsorbed to particles, and as metal droplets. When mercury is converted through microbial action into methyl mercury, it is easily adsorbed by microbes, plants, and animals. Methyl mercury is a potent neurotoxin and is one of the most toxic forms of mercury. Human fetuses and young children, as well as piscivorous (fish-eating) wildlife, are most sensitive to methyl mercury exposure (May et al. 2000).

In response to the concerns and potential risks associated with exposure to mercury, numerous investigations have been conducted within the Yuba River watershed. Preliminary assessments of mercury bioaccumulation within northwestern Sierra Nevada watersheds indicated that the Yuba River is among the areas most severely affected by hydraulic mining and mercury contamination (May et al. 2000).

A more recent study reported that all samples collected in the Yuba River watershed both upstream and downstream of Englebright showed consistent, statistically significant increases above natural background concentrations in methyl mercury and total mercury (Alpers 2005). Mercury bioaccumulation was found to be significantly lower immediately

downstream from Englebright, although some higher values were noted farther downstream in the vicinity of Daguerre Point Dam.

Although exposure levels of methyl mercury in the lower Yuba River were below the Total Threshold Limit Concentration establish in the California Code of Regulations (CFR), the U.S. Food and Drug Administration and the U.S. Environmental Protection Agency (EPA) issued a joint Federal Advisory for mercury concentrations in fish at Englebright. The fish consumption advisory not only suggests a one to two fish per month limit by women of childbearing age and children 17 years of age and younger, but also a four fish per month limit on women beyond childbearing years and men (Klasing and Brodbert 2003).

3.4.2 Effects

Basis of Significance. An alternative would be considered to have a significant effect if it would involve substances identified as potentially hazardous (for example, by the Comprehensive Environmental Response, Compensation, and Liability Act; the Resource, Conservation, and Recovery Act; and/or 40 CFR Parts 260 through 270); and (1) expose workers to hazardous substances in excess of Federal Occupational, Safety, and Health Administration standards, or (2) contaminate the physical environment, thereby posing a hazard to people, animals, or plant populations by exceeding Federal exposure, threshold, or cleanup limits.

No Action. Exposure levels of mercury and methyl mercury in water and sediment within the Yuba River watershed would continue to represent an increased ecological risk to aquatic species. Potential exposure and associated risks to human fetuses and young children, as well as piscivorous wildlife, would also continue to exist within the project area.

Pilot Gravel Injection. The operation of motorized equipment at the pilot gravel injection site and trucks used for hauling gravel to the site would increase the risk of discharging hazardous substances (oil, diesel fuel, hydraulic fluids) into the environment. Project gravel obtained from a commercial source and injected into the river would cause short-term increases in turbidity from released sediments and could potentially release small amounts of mercury from these sediments. Mercury could be ingested by fish and other aquatic organisms or could settle out in sediments farther downstream.

3.4.3 Mitigation

Appropriate best management practices would be implemented in order to ensure that the risk of hazardous materials spills is minimized. The gravel injection contractor would be properly trained to use standard spill prevention and cleanup equipment and techniques including rapid deployment of onsite spill absorption and retention materials.

To minimize release of mercury and methyl mercury into the lower Yuba River, gravel would arrive pre-washed from the commercial quarry to remove sediments containing mercury. Any mercury levels remaining in residual gravel sediments would be considered low, and its release would not be expected to pose any additional environmental or health risk.

Since there would be no significant adverse effects with regards to hazardous, toxic, and radiological waste, no additional mitigation would be required.

3.5 Fisheries

3.5.1 Existing Conditions

About 28 fish species are known to inhabit the lower Yuba River downstream of Englebright Dam (CDFG 1991a). Of these, eight are anadromous and spend a part of their life cycle in the lower Yuba River. The fish species that inhabit the lower Yuba River are shown in Table 6.

Table 6. Fish Species that Inhabit the Lower Yuba River

Species Common Name *Scientific Name*	Location			Native or Nonnative		Salmonid Predator
	Downstream of Daguerre	Upstream of Daguerre	Unknown	Native	Non-native	
Anadromous Fish						
Fall-run chinook salmon *Oncorhynchus tshawytscha*	X	X		X		
Spring-run chinook salmon *Oncorhynchus tshawytscha*	X	X		X		
Central Valley steelhead *Oncorhynchus mykiss*	X	X		X		X
Green sturgeon *Acipenser medirostris*	X			X		
White sturgeon *Acipenser transmontanus*	X			X		
Pacific lamprey *Lampetra tridentate*	X	X		X		
Striped bass *Morone saxatilus*	X	X			X	X
American shad *Alosa sapidissima*	X	X			X	X
Resident Fish						
Rainbow trout *Oncorhynchus mykiss*	X	X		X		X
Hardhead *Mylopharodon conocephalus*	X	X		X		X
Speckled dace *Rhinichthys osculus*	X	X		X		
California roach *Lavinia symmetricus*			X	X		
Sacramento sucker *Catostomus occidentalis*	X	X		X		
Sacramento pikeminnow *Ptychocheilus grandis*	X	X		X		
Mosquitofish *Gambusia affinis*			X		X	

Species Common Name *Scientific Name*	Location			Native or Nonnative		Salmonid Predator
	Downstream of Daguerre	Upstream of Daguerre	Unknown	Native	Non-native	
Largemouth bass *Micropterus salmoides*	X				X	
Smallmouth bass *Micropterus dolomieui*	X				X	X
Green sunfish *Lepomis cyanellus*			X		X	
Bluegill *Lepomis macrochirus*			X		X	
Redear sunfish *Lepomis microlophus*			X		X	
Tule perch *Hysterocarpus traski*	X	X		X		
Riffle sculpin *Cottus gulosus*	X	X		X		
Common Carp *Cyprinus carpio*			X		X	
Brown Bullhead *Ameiurus nebulosus*			X		X	
White Catfish *Ameiurus catus*			X		X	
Channel Catfish *Ictalurus punctatus*			X		X	
Threespine stickleback *Gasterosteus aculeatus*			X	X		

Descriptions of some of the key species supported by the lower Yuba River are provided below. In addition, the lower Yuba River supports two species that are Federally listed as threatened: Central Valley steelhead and Central Valley spring-run chinook salmon (also State listed as threatened). This river also supports two Federal candidate species: Central Valley fall/late fall-run chinook salmon and green sturgeon. Descriptions of these special-status fish species can be found in Section 3.6, Special-Status Species.

Sacramento Sucker

The Sacramento sucker is widely distributed throughout the Sacramento and Feather River systems. Sacramento suckers occupy waters from cold, high-velocity streams to warm, nearly stagnant sloughs. They are common at moderate elevations (600 to 2,000 feet). Sacramento suckers feed on algae, detritus, and benthic invertebrates. They usually spawn for the first time in their fourth or fifth years. When they cannot move upstream and end up spawning in lake habitat, they typically orient themselves near areas where spring freshets flow into the lake. They typically spawn in stream habitat on gravel riffles from late February to early June. The eggs hatch in 3 to 4 weeks, and the young typically live in the natal stream for a couple of years before moving downstream to a reservoir or large river (Moyle 2002).

Sacramento Pikeminnow

Sacramento pikeminnows occupy rivers and streams throughout the Sacramento–San Joaquin River system, including the lower Yuba River. Sacramento pikeminnows spawn in April and May, with eggs hatching in less than a week. Within a week of hatching, the fry are free swimming and schooling.

Adult pikeminnows may feed on other fish, including juvenile pikeminnow, chinook salmon, and steelhead, but according to Moyle (2002), are overrated as predators on salmonid species in natural environments. They can, however, be major predators on juvenile salmon and steelhead in riverine environments modified by dams and fish ladders. Pikeminnows tend to remain in well-shaded, deep pools with sand or rock substrate and are less likely to be found in areas where there are higher numbers of introduced predator species such as largemouth bass and other centrarchid species.

Striped Bass

Striped bass are anadromous fish that have been an important part of the sport-fishing industry in the Delta. They were introduced into the Sacramento–San Joaquin estuary between 1879 and 1882 (Moyle 2002). Their range in the lower Yuba River is limited to the reach of the rivers below the dams. Striped bass may move into the lower reaches of the rivers year round but probably most often between April and June, when they spawn. The species tends to remain in deep, slow-moving water, where it has access to prey without having to expend a great deal of energy.

American Shad

American shad are anadromous fish that have been introduced into the Central Valley and have become established as a popular sport fish. The main American shad runs in California are in the Sacramento River up to Red Bluff and in the lower reaches of the river's major tributaries (American, Feather, and Yuba Rivers), as well as the Mokelumne and Stanislaus Rivers. American shad enter the lower Yuba River to spawn during the spring (primarily May and June) and support a seasonal fishery downstream of Daguerre Point Dam. Shad abundance increases at higher Yuba River flows relative to flows in the Feather and Sacramento Rivers.

3.5.2 Effects

Basis of Significance. An alternative would be considered to have a significant effect on fisheries resources if it would result in a reduction in fish populations or substantially degrade the water quality of fish habitat by increasing the concentrations and total amounts of suspended solids or toxic substances.

No Action. Without additional gravel delivery to the channel immediately below Englebright, the existing gravel supply in the bed and usable gravel stored in downstream bars would decrease as it is gradually transported downstream and out of the project reaches. A

continued degradation to physical habitat structure and ecological function of the lower Yuba River would be expected.

Pilot Gravel Injection. Gravel injected into the river would cause short-term increases in turbidity and temporarily disturb fish in the stream channel. Increases in turbidity (suspended sediments) could disrupt feeding activities of common fish species or result in temporary displacement from preferred habitats. Gravel injected into the river bed could also bury stream substrates that provide habitat for aquatic invertebrates, an important food source for fishes. Consequently, growth rates of fish could be reduced if turbidity levels or sediments substantially exceed ambient levels for prolonged periods. However, because of the limited amount of gravel, as well as the movement and settling of the gravel and sediments, the elevated turbidity levels would be short term, localized, and less than significant. There would be no long-term adverse effects on fish.

3.5.3 Mitigation

Since there would be no significant effects on fish, no mitigation would be required. However, to minimize the effects of the proposed action, gravel would arrive pre-washed from the commercial quarry. In addition, the work would be conducted during the late spring or summer outside the spawning seasons for the fish.

3.6 Special Status Species

This section describes the special-status species, specifically Federal and State-listed species and candidate species, which may be present or have the potential to occur at the project site.

3.6.1 Existing Conditions

Special-status species that have the potential to occur in the vicinity of the project area were determined through a review of various sources including USFWS species lists (updated February 23, 2007, Appendix C), California Natural Diversity Database (CNDDB), Rarefind electronic database (CDFG 2007), and California Native Plant Society Inventory of Rare and Endangered Plants, 7th edition (online) (CNPS 2007). The special-status wildlife, fish, and plant species obtained through these sources were consolidated and are listed in Appendix D.

Each species on the consolidated list was evaluated for its potential to occur within the project area. Species that are not found in land cover types present in the project area or whose known range falls outside of the project area were eliminated from further consideration. Those special-status species that are known to occur or have the potential to occur within the project area are further evaluated in the following sections.

Wildlife Species

Eight special-status wildlife species were identified as having the potential to occur in the project area or are known to occur in the project area. These wildlife species include:

- long-eared owl (*Asio otus*)
- Swainson's hawk (*Buteo swainsoni*)
- tricolored blackbird (*Agelaius tricolor*)
- western burrowing owl (*Athene cunicularia hypugea*)
- western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)
- giant garter snake (*Thamnophis gigas*)
- northwestern pond turtle (*Clemmys marmorata marmorata*)
- valley elderberry longhorn beetle (*Democerus californicus dimorphus*)

Long-eared Owl. The long-eared owl is designated as a California species of concern. The long-eared owl requires wooded areas for daytime roosting with adjacent open areas to forage. Their habitat requirements do not change between breeding and wintering although during breeding season the owls become very territorial and subsequently dispersed, whereas during the winter months they roost communally in groups of 7 to 50 birds. In the west and southwest, long-eared owls are found in deciduous woods near lakes and streams where growth of climbing vines provide dense roosting cover during winter. The long-eared owl does not build its own nest and instead will use old crow, magpie, squirrel, or other large abandoned stick nests. Irregularly, it will also use a natural cavity in a tree, cliff, or on the ground.

A CNDDB records search did not identify occurrences of long-eared owls within the project area. However, a nest tree is located several miles south of the project area in the Spenceville Wildlife Area operated by the California Department of Fish and Game (CDFG) (CDFG 2007). Formal surveys have not been performed to determine whether this species is currently present and nesting within the project area.

Swainson's Hawk. The Swainson's hawk is designated as a California threatened species. In the Central Valley, the Swainson's hawk nests primarily in riparian areas adjacent to agricultural fields or pastures, although it sometimes uses isolated trees or roadside trees. The Swainson's hawk nests in mature trees; its preferred tree species are valley oak, cottonwood, willow, sycamore, and walnut. Nest sites typically are located near suitable foraging areas. The primary foraging areas for Swainson's hawk include open agricultural lands and pastures.

The riparian forest in the vicinity of Daguerre Point Dam is dominated by native woody riparian tree species that provide potential nest sites for Swainson's hawk. A CNDDB records search identified one occurrence of a breeding pair in the vicinity of the project area (CDFG 2007). This occurrence was east of Yuba City off Hammonton-Smartville Road. The Swainson's hawk is also a permanent resident downstream of the project area near the confluence of the Yuba River with the Feather River. Formal surveys have not been performed to determine whether this species is currently present and nesting within the project area.

However, Swainson's hawk is expected to forage in the lower portion of the project area. There is no suitable habitat for this species in the vicinity of the proposed gravel injection site.

Western Burrowing Owl. The western burrowing owl is designated as a California species of concern. It is a permanent resident in the Central Valley. Suitable habitat for burrowing owl occurs in ruderal habitats and near agricultural lands throughout the study area. The western burrowing owl nests and roosts in abandoned ground squirrel and other small-mammal burrows, as well as artificial burrows (culverts, concrete slabs, and debris piles). The owl's breeding season is from March to August and peaks in April and May.

A CNDDB records search identified one historical occurrence of a breeding pair in the vicinity of the project area (CDFG 2007). This 1906 occurrence was in the area now known as the Goldfields adjacent to Daguerre Point Dam. Formal surveys have not been performed to determine whether this species is present and nesting in the project area.

Tricolored Blackbird. The tricolored blackbird is designated as a California species of concern. The tricolored blackbird inhabits open valleys and foothills, and may be found in streamside forests, alfalfa and rice fields, marshes, and along reservoirs. This blackbird usually nests in marshes, but may also nest in willow and blackberry thickets and on the ground in clumps of nettles. They forage in wet meadows, rice and alfalfa fields, and in rangelands. They commonly roost in trees or marshes. Whether they are roosting, foraging, or nesting, these birds are always found in very large flocks. The tricolored blackbird both nests and winters in interior valleys from southern Oregon (east of the Cascades) to northwest Baja California. Once abundant in Yuba County, the tricolored blackbird has been possibly eliminated from the county and breeds only in a few scattered areas in California and Oregon.

A CNDDB records search identified a historical tricolored blackbird colony site near the confluence of dry creek and the Yuba River. This site has since been developed as an RV Park. The last tricolored blackbird sighting in this area was April 23, 1994 (CDFG 2007). There is no suitable habitat for this species in the vicinity of the proposed gravel injection site.

Western Yellow-Billed Cuckoo. The Western yellow-billed cuckoo is State listed as an endangered species and is a candidate for Federal listing. This species requires large patches (25 acres or larger) of mixed old-growth riparian forests composed of willow and cottonwood trees with dense understory. Dense cottonwood riparian forest is present in the vicinity of Daguerre Point Dam. However, the riparian forest exists as narrow patches found upstream and downstream of Daguerre Point Dam. A CNDDB records search did not identify occurrences of western yellow-billed cuckoos within the project area (CDFG 2007). In addition, statewide surveys conducted in 1999/2000 by USGS and USFWS documented no individuals nesting downstream within the Feather River channel.

Giant Garter Snake. The giant garter snake is Federally and State listed as threatened. The giant garter snake is endemic to emergent wetlands in the Central Valley. Within the project vicinity, the giant garter snake is still presumed to occur in the rice production zones of Yuba, Sutter, Butte, Colusa, and Glenn Counties. The species' habitat includes marshes, sloughs, ponds, small lakes, and low-gradient waterways such as small streams, irrigation and

drainage canals, and rice fields (58 FR 54053, October 20, 1993). The giant garter snake is active from approximately May through October and hibernates during the remainder of the year.

The giant garter snake requires adequate water with herbaceous, emergent vegetation for protective cover and foraging habitat. All three habitat components (cover and foraging habitat, basking areas, and protected hibernation sites) are needed. Riparian woodlands and large rivers typically do not support giant garter snakes because these habitats lack emergent vegetative cover, basking areas, and prey populations.

A CNDDB records search did not identify occurrences of giant garter snake within the project area. Formal surveys have not been performed to determine whether this species is currently present within the project area. However, there is no suitable habitat for this species in the vicinity of the propose gravel injection site.

Northwestern Pond Turtle. The northwestern pond turtle is designated as a California species of concern. The northwestern pond turtles inhabit permanent or nearly permanent waters with little or no current. The channel banks of inhabited waters usually have thick vegetation, but basking sites such as logs, rocks, or open banks must also be present. Eggs are laid in nests along sandy banks of large slow-moving streams or in upland areas, including grasslands, woodlands, and savannas. Nest sites are typically found on a slope that is unshaded and has a high clay or silt composition and in soil at least 4 inches deep.

Ponded water bodies and some agricultural ditches and canals in the vicinity of the project area provide suitable habitat for this species. A CNDDB records search identified three occurrences of northwestern pond turtles in the vicinity of the project area (CDFG 2007). Two occurrences were associated with natural stream courses and agricultural ditches adjacent to the proposed gravel haul route on Peoria and Scott Forbes Roads. There is no suitable habitat for this species in the vicinity of the proposed gravel injection site.

Valley Elderberry Longhorn Beetle. Elderberry shrubs are the host plant of the valley elderberry longhorn beetle (VELB), which is Federally listed as threatened. Current information on the habitat of the beetle indicates that it is found only with its host plant, the elderberry. Adult VELB feed on foliage and are active from early March through early June. The beetles mate in May, and females lay eggs on living elderberry shrubs. Larvae bore through the stems of the shrubs to create an opening in the stem, within which they pupate. After metamorphosing into an adult, the beetle chews a circular exit hole, through which it emerges.

Elderberry shrubs in the Central Valley are commonly associated with riparian habitat, but also occur in oak woodlands and savannas and in disturbed areas. There are several CNDDB records of VELB occurrences in vicinity of Daguerre Point Dam (CDFG 2007). However, there is no suitable habitat for this species in the vicinity of the proposed gravel injection site.

Fish Species and Designated Critical Habitat

The following special-status fish species and designated critical habitats were identified as having the potential to occur or are known to occur in the project area. These fish species and designated critical habitats include:

- Central Valley fall/late fall-run chinook salmon (*Oncorhynchus tshawytscha*)
- Central Valley spring-run chinook salmon (*Oncorhynchus tshawytscha*)
- Central Valley spring-run chinook salmon critical habitat
- Central Valley steelhead (*Oncorhynchus mykiss*)
- Central Valley steelhead critical habitat
- green sturgeon (*Acipenser medirostris*)

During the early to mid-1900's, anadromous fish species were adversely affected to upstream migration by ineffective fishway ladders existing at Daguerre Point Dam (Corps 2001). Low streamflows and high water temperatures in the Yuba River also affected the species. Measures were implemented to address these problems, including reconstruction of the Daguerre Point Dam fish ladders in 1950, establishing flow fluctuation regulations (500 cfs/hour) below Englebright in 1955, and reducing fish entrainment at water diversion facilities beginning in 1984. The commencement of operations at New Bullards Bar Dam in 1970 improved conditions for salmonids in the lower Yuba River by providing cooler water temperatures and more reliable flows in the summer and fall (NMFS 2005b).

Fall/Late Fall-run Chinook Salmon. On March 9, 1998 (63 FR 11481), NMFS issued a proposed rule to list fall-run Chinook salmon as threatened, but on September 16, 1999 (64 FR 50393), NMFS determined that fall-run Chinook salmon did not warrant being listed as threatened and downgraded it to candidate status. NMFS indicated that the Central Valley fall-run and late fall–run Chinook salmon are a single evolutionarily significant unit (ESU); they are discussed together in this section, even though there are some differences in the life histories of the two runs. There is no State protection for fall-run or late fall–run Chinook salmon.

Fall-run Chinook salmon are the most abundant anadromous fish in the Central Valley. The CDFG began making annual estimates of fall-run Chinook Salmon spawning escapement in the lower Yuba River in 1953 (CDFG 1991a). From 1953 to 2003, escapement estimates ranged from 1,000 fish in 1957 to 39,367 fish in 1982, with an average population of 14,855 fish for the survey period. The 2003 population was 28,897 fish (CDWR 2005a).

Adult fall-run Chinook salmon immigration and holding generally occurs in the lower Yuba River beginning in July and peaking in November. By the end of November, typically greater than 90 percent of the run has entered the river. Timing of the adult Chinook salmon spawning activity is strongly influenced by water temperatures (YCWA 2006). Optimal water temperatures for egg incubation are 44 to 54°F (Rich 1997). Newly emerged fry remain in shallow, lower velocity edgewaters, particularly where debris collects and makes the fish less visible to predators (CDFG 1998). The duration of egg incubation and time of fry emergence depend largely on water temperature. In general, eggs hatch after a 3- 5-month incubation

period, and alevins (yolk-sac fry) remain in the gravel until their yolk-sacs are absorbed (2 to 3 weeks).

Juvenile Chinook salmon move out of upstream spawning areas into downstream habitats in response to many factors including inherited behavior, habitat availability, flow, competition for space and food, and water temperature. The number of juveniles that move and the timing of movement are highly variable. Storm events and the resulting high flows appear to trigger movement of substantial numbers of juvenile Chinook salmon to downstream habitats. In general, juvenile abundance in the Sacramento–San Joaquin River Delta (Delta) increases as flow increases (USFWS 1993). Fall-run Chinook salmon emigrate as fry and subyearlings, and remain off the California coast during their ocean migration.

Spring-Run Chinook Salmon. NMFS designated the Central Valley spring-run Chinook as threatened on September 16, 1999 (64 FR 50393). On February 5, 1999, the California Fish and Game Commission listed spring-run Chinook salmon as threatened under CESA. Critical habitat for this ESU, which includes the lower Yuba River, was designated on September 2, 2005. The rule became effective on January 2, 2006.

Historically, spring-run Chinook salmon were the second most abundant run of Central Valley Chinook salmon (Fisher 1994). They occupied the headwaters of all major river systems in the Central Valley where there were no natural barriers. Spring-run Chinook salmon, like steelhead, migrated farther into headwater streams where cool, well-oxygenated water is available year round. It is estimated that there were 6,000 miles of salmon habitat in the Central Valley Basin, much of it high elevation spring-run Chinook salmon habitat. By 1928, however, 80 percent of this habitat had been lost (Clark 1929). Major in-basin factors contributing to the habitat decline were migration barriers, hydraulic mining, and water diversions.

The Feather River Fish Hatchery sustains the spring-run population on the Feather River, but the genetic integrity of that run is questionable (CDWR 1997). Estimates since 1953 on the Feather River indicate numbers of spring-run returning to the hatchery average around 2,115, although the estimates have increased dramatically since 1990. Part of the significance of this Yuba River fishery is that it supports natural reproduction that is not augmented with hatchery transplants, although CDFG did conduct a one-time stocking of a small number of juvenile spring-rune fish from the Feather River Hatchery into the Lower Yuba River in 1980 (CDFG 1991a).

Spawning surveys and adult monitoring at the fish ladders on Daguerre Point Dam conducted by CDFG have detected the continued presence of a small population of spring-run Chinook salmon immigrating into the lower Yuba River. A total of 108 adult Chinook salmon were estimated to have passed the dam during a study conducted from March 1, 2001, through July 31, 2001, the primary historical migration period for spring-run Chinook salmon (CDFG 2002). The installation of a VAKI River Watcher fish imaging system in the North and South Fish Ladders at Daguerre Point Dam in 2003 contributed substantially to the current understanding of the number and timing of immigration of spring-run Chinook salmon. In the spring of 2004 (the first spring that this equipment was fully operational) at total of 413 adult

Chinook salmon were detected migrating up past Daguerre Point Dam from April through June (NMFS 2005b). The migration timing and location of these fish indicate that they were all Central valley spring-run Chinook salmon. During 2005, the year in which the VAKI operated continuously during the primary historical migration period, 1,021 Chinook salmon (including grilse) were observed (YCWA 2006).

Spawning occurs in the lower Yuba River from September through November (CDFG 1991a). Approximately 60 percent of the Chinook salmon population in the lower Yuba River spawn above Daguerre Point Dam (SWRCB 2003). Chinook salmon redds have been observed in the Garcia Gravel Pit Reach (primarily above Parks Bar) by mid-September (CDFG 2000). Water depth and velocity are directly related to the characteristics of spawning habitats. Emergence takes place in March and April. Spring-run Chinook salmon appear to emigrate at two different life stages: fry or yearlings. Fry move between February and June, and yearlings emigrate October–March, peaking in November (Cramer and Demko 1997).

Juveniles display considerable variation in stream residence and migratory behavior. Juvenile spring- and fall-run Chinook salmon may leave their natal streams as fry soon after emergence or rear for several months to a year before migrating as smolts or yearlings (Yoshiyama et al. 1998). Triggers for downstream movement are similar to those described for fall-run Chinook salmon above. Recent fish trapping operations in the lower Yuba River indicate that large numbers of Chinook salmon fry leave the river in December–March (CDFG unpublished data). Movement of juvenile spring-run Chinook salmon in the Feather River is probably similar to the Yuba River. A second, smaller peak of smolt-sized fish emigrates in April–June. Most of these observations apply to fall-run Chinook salmon, but may also apply, to an unknown degree, to spring-run Chinook salmon.

Central Valley spring-run Chinook salmon critical habitat. On February 16, 2000, NMFS designated critical habitat for the Central Valley spring-run Chinook salmon ESU (63 FR 11482)(NMFS 2002). Critical habitat consists of water, substrate, and adjacent riparian zone of accessible estuarine and riverine reaches. Accessible reaches are those within the historical range of the Central Valley spring-run Chinook ESU that can still be occupied by any life stage of Chinook salmon. Inaccessible reaches are those above long-standing, naturally impassable barriers (natural waterfalls in existence for at least several hundred years) and specific dams within the historical range of each ESU. Adjacent riparian zones are defined as the area adjacent to a stream that provides the following functions: shade, sediment transport, nutrient or chemical regulation, streambank stability, and input of large woody debris or organic matter.

Critical habitat for Central Valley spring-run Chinook is designated to include all river reaches accessible to Chinook salmon in the Sacramento River and its tributaries in California (NMFS 2002). Also included are river reaches and estuarine areas of the Sacramento-San Joaquin Delta; all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge. Excluded are areas above specific dams or above longstanding naturally impassable barriers.

Central Valley Steelhead. NMFS completed a status review of steelhead populations in Washington, Oregon, Idaho, and California and identified 15 ESU's in this range. On August 9, 1996, NMFS issued a proposed rule to list five of these ESU's (including the Central Valley steelhead) as endangered and five as threatened under the ESA (61 FR 155). The Central Valley steelhead ESU was later listed as threatened (downgraded from its proposed status of endangered) (63 FR 13347, March 19, 1998). The threatened status was reaffirmed on January 5, 2006, to include all naturally spawned Central Valley steelhead populations below natural and manmade impassable barriers in the Sacramento and San Joaquin Rivers and their tributaries, as well as two artificial propagation programs: the Coleman National Fish Hatchery and Feather River Hatchery steelhead hatchery programs. The critical habitat final designation was published on September 2, 2005 (70 FR 52488), with an effective date of January 2, 2006.

Historically, steelhead spawned and reared in most of the accessible upstream reaches of Central Valley rivers, including the Yuba, Feather, and Sacramento Rivers and their perennial tributaries. Compared with Chinook salmon, steelhead generally migrated farther into tributaries and headwater streams where cool, well-oxygenated water was available year-round. Declines in steelhead abundance have been attributed largely to dams that eliminated access to most of their historic spawning and rearing habitat, and restricted steelhead to less suitable habitat below the dams. Other factors that have contributed to the decline of steelhead and other salmonids include habitat modification, over-fishing, disease and predation, inadequate regulatory mechanisms, climate variation, and artificial propagation (NMFS 2006).

The CDFG estimated that only approximately 200 steelhead spawned annually in the lower Yuba River prior to 1969. During the 1970's, CDFG annually stocked hatchery steelhead from the Coleman National Fish Hatchery into the lower Yuba River, and by 1975 estimated a run size of about 2,000 fish (CDFG 1991a). Since 1975, the run size has not been estimated, but is believed to be "stable" and supports a significant recreational fishery (McEwan and Jackson 1996). CDFG stopped stocking steelhead into the lower Yuba River in 1979, and currently manages the river to protect the natural steelhead production through strict "catch-and-release" fishing regulations.

The upstream migration of adult steelhead in the mainstem Sacramento River historically started in July, peaked in September, and continued through February or March (McEwan and Jackson 1996). Currently, upstream migration in the lower Yuba River occurs from August through March and peaks in October and February (CDFG 1991a). Central Valley steelhead spawning generally occurs from January through April in the lower Yuba River (CDFG 1991a). However, redds have been observed as late as August. Many of the late-spawning fish appear to be resident rainbow trout.

Egg incubation time in the gravel is determined by water temperature, with optimal egg incubation temperatures reported to range from 48°F to 52°F (CDFG 1991b). Steelhead fry usually emerge from the gravel 2 to 8 weeks after hatching, usually between February and May, but sometimes into June (CDFG 1991b). Newly emerged steelhead fry move to shallow, protected areas along streambanks and then move to faster, deeper areas of the river as they

grow. Juvenile steelhead feed on a variety of aquatic and terrestrial insects and other small invertebrates.

Juvenile steelhead rear throughout the year and may spend from 1 to 3 years in freshwater before emigrating to the ocean. Juvenile steelhead rear in the lower Feather and Bear Rivers throughout the year (CDFG 1991b). Smoltification is the physiological adaptation that juvenile salmonids undergo to tolerate saline waters. This process occurs in juveniles as they begin their downstream migration. Smolting steelhead generally emigrate from March to June (CDFG 1991b).

Central Valley Steelhead Designated Critical Habitat. On February 16, 2000, NMFS designated critical habitat for the Central Valley steelhead ESU (63 FR 11482) (NMFS 2002). Critical habitat for Central Valley steelhead is designated to include all river reaches accessible to listed steelhead in the Sacramento River and San Joaquin Rivers and their tributaries in California (NMFS 2002). Also included are river reaches and estuarine areas of the Sacramento-San Joaquin Delta; all waters from Chipps Island westward to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay, and Carquinez Strait; all waters of San Pablo Bay westward of the Carquinez Bridge; and all waters of San Francisco Bay (north of the San Francisco/Oakland Bay Bridge) from San Pablo Bay to the Golden Gate Bridge. Excluded are areas of the Merced River confluence and areas above specific dams or above longstanding naturally impassable barriers.

Green Sturgeon. On April 7, 2006, NMFS published the final rule to designate the southern DPS of green sturgeon as threatened effective June 6, 2006 (71 FR 17757). There is no State protection for this species. There are confirmed observations of both white sturgeon (*Acipenser transmontanus*) (CDWR 2005b) and green sturgeon (*Acipenser medirostris*) (NMFS 2005a) in the Feather River near the mouth of the Yuba River, and unconfirmed species observations of sturgeon in the Yuba River below Daguerre Point Dam (NMFS 2005b). However, it is believed that adult sturgeon are unable to ascend the fish ladder structures existing at Daguerre Point Dam (NMFS 2005b). Therefore, Daguerre Point Dam may be considered a barrier to the upstream migration of green sturgeon in the Lower Yuba River.

Although life stages in fresh water may last up to 2 years, green sturgeon are the most marine of sturgeon species, coming into rivers mainly to spawn. Adults and juvenile sturgeon are benthic (bottom) feeders, but may also take small fish. Juveniles in the Delta estuary primarily feed on opossum shrimp and amphipods (Moyle 2002).

Incidental capture of larval green sturgeon in salmon out-migrant traps indicates that the lower Feather River may be a principal spawning area; green sturgeon may also spawn in the mainstem Sacramento River. Adults have been reported as far upstream as Red Bluff, and young have been recorded in a number of places downstream. Some spawning may also take place in the lower San Joaquin River because young green sturgeon have been taken at Santa Clara Shoal in the Brannan Island State Recreational Area. Preferred spawning substrate is likely large cobble, but can range from clean sand to bedrock. Eggs are broadcast and externally fertilized in relatively fast water and probably in depths greater than approximately

10 feet. The importance of water quality is uncertain, but a small amount of silt is known to prevent the eggs from adhering to each other, thus increasing survival (Moyle 2002).

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1996 governs the conservation and management of ocean fisheries. The purpose of the Act is to take immediate action to conserve and manage the fishery resource off the U.S. coasts and U.S. anadromous species, and promote the protection of Essential Fish Habitat (EFH).

EFH is the aquatic habitat (water and substrate) necessary for fish to spawn, breed, feed, or grow to maturity (NMFS 2002) that will allow a level of production needed to support a long-term, sustainable commercial fishery and contribute to a healthy ecosystem. For the Sacramento River watershed, the aquatic areas identified as EFH for Chinook salmon are within the hydrologic unit map numbered 18020109 (Lower Sacramento River) and 18020112 (upper Sacramento River to Clear Creek) (NMFS 2002). The upstream extent of Pacific salmon EFH in the Yuba River is to Englebright Dam at river mile 23.9.

Plant Species

Only one special-status plant species, Brandegee's Clarkia (*Clarkia biloba ssp. Brandegee*), was identified as having the potential to occur in the project area or is known to occur in the project area. This plant species is discussed below.

Clarkias are showy California native annuals and their colors add to the beauty of the Sierra spring landscape. Some species used in commercial flower seed mixes have names like "fare-well-to-spring," "fairy fans," "red ribbons," and "summer's darling." There are about 40 species of *Clarkia*, almost all in western North America.

Brandegee's Clarkia is found in dry habitats below 2,500 feet in six counties of the northern Sierra. It typically grows on gravelly slopes above creeks and rivers and along roadsides. Brandegee's Clarkia may bloom from May to July depending on weather conditions and location. A CNDDB records search identified one occurrence of Brandegee's Clarkia in the vicinity of the project area (CDFG 2007). This occurrence (recorded in 1971) was located east of the Sierra Foothill Research and Extension Center near Scott Forbes Road. This road is the proposed haul route for gravel delivery to the proposed gravel injection site.

3.6.2 Effects

Basis of Significance. An alternative would be considered to have a significant effect on special status species if it would result in the "take" of a Federally or State-listed threatened or endangered species, adversely affect designated critical habitat, or substantially affect any other special status species, including degradation of its habitat.

No Action. Without additional gravel delivery to the channel immediately below Englebright, the existing gravel supply in the bed and usable gravel stored in downstream bars

would decrease as it is gradually transported downstream and out of the project reaches. A continued degradation to physical habitat structure and ecological function of the lower Yuba River would be expected.

Pilot Gravel Injection. Since there is no suitable habitat for any of the wildlife or plant species in or near the gravel injection site, the proposed action would have no adverse effects on any of these species. However, the pilot gravel injection is likely to affect, but not likely to adversely affect, the following listed fish species: Central Valley fall/late fall-run chinook salmon, Central Valley spring-run chinook salmon, and Central Valley steelhead. The proposed pilot gravel injection may also affect but not likely destroy or adversely modify by appreciably diminishing the value of designated critical habitat necessary for the survival or the recovery of the Central Valley spring-run chinook salmon and Central Valley steelhead.

The proposed pilot gravel injection short-term effects may include localized and temporary disturbance, displacement, or impairment of feeding, migration, or other essential behaviors by adult and juvenile salmon and steelhead from noise, suspended sediment, turbidity, and sediment deposition generated during gravel injection activities. Gravel injected into the river would cause short-term increases in turbidity and temporarily disturb salmonids within the stream channel. Short-term increases in turbidity and suspended sediment may disrupt feeding activities of salmonids or result in temporary displacement from preferred habitats. Gravel injected into the river bed could also bury stream substrates that provide habitat for aquatic invertebrates, an important food source for salmonids. Consequently, growth rates of salmonids could be reduced if suspended sediment and turbidity levels substantially exceed ambient levels for prolonged periods.

Long-term effects of the proposed pilot gravel injection on the critical habitat of salmonids include alteration of river hydraulics and substrate conditions within the river channel. The total aquatic volume of the Narrows II pool may be initially decreased by deposition of injected gravel. However, it is expected that a substantial portion of the introduced substrate would eventually be transported downstream to hydraulically shielded areas during periods of greater discharge.

Whether the modified channel offers more favorable habitat for spawning and rearing, and whether more favorable fish habitat translates to increased biological production remains uncertain. The proposed gravel injection site within the Narrows reach may have primarily served as a pathway for fish traveling to and from spawning habitat farther upstream in the drainage network. With upstream migration blocked by Englebright, this mainstream channel becomes the upstream-most available location to create alluvial habitat.

The key challenge is to balance the need for reduced gravel mobility with the biological requirement of preferred substrate, depth, and flow velocity for spawning and redd survival. Achieving this balance is particularly difficult because of the wide range of flow magnitudes that must be accounted for. Implementation of the proposed gravel injection project would improve the understanding of how gravel resources (spawning habitat) respond to changes in flow, and allow better identification of channel reaches where a long-term gravel augmentation program might be most beneficial.

3.6.3 Mitigation

To avoid or minimize potential effects on these listed species, the proposed pilot injection of gravel would be scheduled for the period from May 1 to September 30 outside the spawning seasons for these species (Table 7). Gravel would also arrive pre-washed from the commercial quarry. Any elevated turbidity resulting from residual gravel sediments would be temporary and localized, and would not have long-term, permanent effects. It is expected that fish would avoid the gravel injection site by moving out of the affected area.

As a result, the Corps has determined that implementation of the pilot gravel injection project immediately below Englebright Dam (in order to satisfy the Terms and Conditions of the incidental take statement included in the BO dated March 27, 2002) would have no significant adverse effects on the listed Central Valley spring chinook salmon and Central Valley steelhead, nor would it likely destroy or adversely modify the designated critical habitat for these species. The Corps is currently seeking NMFS concurrence with that determination.

3.7 Air Quality

3.7.1 Existing Conditions

Regulatory Background. The Federal Clean Air Act establishes National Ambient Air Quality Standards (NAAQS) and delegates enforcement to the states, with direct oversight by the U.S. EPA. In California, the Air Resources Board is the responsible agency for air quality regulation.

The California Clean Air Act established California Ambient Air Quality Standards, which are more stringent than Federal standards and include pollutants not listed in Federal standards. All Federal projects in California must comply with the stricter California air quality standards.

On November 3, 1993, the U.S. EPA issued the General Conformity Rule stating that Federal actions must not cause or contribute to any violation of a NAAQS or delay timely attainment of air quality standards. A conformity determination is required for each pollutant where the total of direct and indirect emissions caused by a Federal action in a nonattainment area exceeds *de minimus* threshold levels listed in the rule (40 CFR 93.153).

Sources of Pollution. The project area is located in the Sacramento Valley Air Basin, which is composed of Butte, Colusa, Glenn, Placer, Sacramento, Shasta, Solano, Sutter, Tehama, Yolo, and Yuba Counties (CARB 2007). The topographic boundaries of the basin, coupled with light winds and atmospheric stability, make the basin susceptible to the accumulation of air pollutants. On many summer days, a "delta breeze" blows in from the ocean towards Sacramento. These winds can transport air pollution from the Bay Area to the Sacramento Air Basin. The delta breeze turns northward and moves Sacramento's air pollution

Table 7. Life Stage Timing of Selected Fish Species that Inhabit the Lower Yuba River

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fall-Run Chinook Salmon												
Adult Migration												
Spawning												
Egg Incubation												
Emergence												
Fry Rearing & Emigration												
Juvenile Rearing & Emigration												
Spring-Run Chinook Salmon												
Adult Migration												
Summer Holding (Adults)												
Spawning												
Egg Incubation												
Emergence												
Fry Rearing & Emigration												
Juvenile Rearing and Emigration												
Steelhead												
Adult Migration												
Spawning												
Incubation												
Emergence												
Juvenile Emigration												
Adult Emigration												
Juvenile Rearing												

Low probability of occurrence, not included in the assessment of the project effects.

Primary occurrence included in the assessment of project effects.

Source: Table modified from CDFG (1991a) and ENTRIX (2004).

up toward the north end of the Sacramento Valley and to the east into the Sierra Nevada foothills and project area. When the wind blows out of the north, Sacramento air pollution can be transported into the San Joaquin Valley Air Basin to the south.

The Sacramento Valley Air Basin is designated for ozone, nitrogen dioxide, particulate matter greater than 10 microns (PM10), sulfates, and visibility reducing particles. The major air pollution problems in the basin are high concentrations of oxidants and suspended particulates. Both pollutants frequently exceed air quality standards. The largest source of oxidants in the basin is motor vehicles, and the major source of suspended particulates is agriculture.

Local Air Quality Management. Management of Federal and State air quality standards in the project area is the responsibility of the Feather River Air Quality Management District in Yuba County. The pollutants that are monitored by Yuba County include carbon monoxide, sulfur dioxide, lead, and hydrogen sulfide. An air quality monitoring station is located in Yuba City, California. Yuba County is designated as "unclassified" or "in attainment" for carbon monoxide, nitrogen dioxide, and sulfur dioxide. Yuba County is in "non-attainment" for ozone and PM10 (FRAQMD 2004).

Sensitive Receptors. Sensitive receptors include sensitive land uses and those individuals and/or wildlife that could be affected by changes in air quality due to construction of the project. Examples of sensitive land uses include residences, schools, playgrounds and parks, and hospitals. There are no sensitive land uses in the project area. The only sensitive receptors would be nearby recreationists and wildlife.

3.7.2 Effects

Basis of Significance. An alternative would be considered to have a significant effect on air quality if it would violate any ambient air quality standard, contribute on a long-term basis to an existing or projected air quality violation, expose sensitive species or humans to substantial pollutant concentrations, or not conform to applicable Federal standards.

No Action. Under this alternative, the air quality conditions in the vicinity of the project area would remain the same. Air quality would continue to be influenced by climatic conditions, and local and regional emissions from vehicles and agricultural activities.

Pilot Gravel Injection. The proposed pilot gravel injection would have short-term effects on air quality in the area. Operation of the conveyor equipment, a loading dozer, and gravel transport vehicles would produce emissions and PM10, as well as increase fugitive dust from gravel injection activities. The pilot gravel injection of approximately 500 tons is expected to take place over 1 to 2 days. Based on the equipment needed and estimated hours of operation for each piece of equipment, the estimated emissions and PM10 would not be expected to exceed Federal or State standards or *de minimus* thresholds. No conformity determination would be required.

3.7.3 Mitigation

Although there would be no significant effects on air quality, the following best management practices would be implemented to reduce equipment emissions, PM10, and fugitive dust:

Equipment Emissions

- The selected contractor would be responsible to ensure that all heavy-duty equipment is properly tuned and maintained, in accordance with manufacturers' specifications.
- Gravel transport vehicles and conveyor equipment would be shut down when not in use.

Particulate Matter

- Conveyor loading operations would be suspended when winds exceed 20 miles per hour.
- All trucks hauling gravel into the project area would be operated in accordance with the requirements of California Vehicle Code Section 23114. If necessary, all materials transported onsite would be adequately watered or covered.
- The gravel staging area would be watered as needed to control fugitive dust generated by equipment and activities.
- Construction equipment and vehicular traffic on unpaved roads would be restricted to a 15-mile per hour speed limit.

3.8 Recreation

3.8.1 Existing Conditions

The primary recreation activities within the project area are fishing and boating. Other activities may include hunting, swimming, and gold panning. These activities occur mostly upstream of the Highway 20 bridge, although some do occur between Daguerre Point Dam and Highway 20. Public access upstream of the Highway 20 bridge is limited due to private ownership of nearby lands.

Englebright Reservoir at the upstream project boundary is unique in that it offers boat-in camping. The lake itself has provided pleasant days of sightseeing, fishing, swimming, waterskiing, and picnicking for thousands of visitors for over 60 summers.

The Sycamore Ranch RV Park and Campground is a developed recreation area located near the confluence of Dry Creek and the Yuba River. This facility offers tent and RV camping, fishing access to the Yuba River and Dry Creek, and swimming in the Yuba River.

Special fishing regulations are in effect on the lower Yuba River within the project area. From Daguerre Point Dam upstream to the Highway 20 (Parks Bar) Bridge, one hatchery trout or one hatchery steelhead may be taken. Any salmon caught must be immediately

released. Open season lasts all year. No fishing is allowed above the Highway 20 Bridge to Englebright after August 31, 2006. Therefore, no anglers should be in the vicinity of the pilot gravel injection site while project activities are conducted.

The California Department of Fish and Game (CDFG), in cooperation with the University of California Sierra Foothill Research and Extension Center, provides a limited number of anglers with fishing access to a remote section of the lower Yuba River on Extension Center property. This angling opportunity is available to a limited number of anglers through a random draw offered by CDFG. The lower Yuba River angling access program terminates at the end of open season (August 31) for trout and salmon in this area.

3.8.2 Effects

Basis of Significance. An alternative would be considered to have a significant effect on recreation if it would result in loss of recreational facilities, cause a substantial disruption in a recreational activity or opportunity, or substantially diminish the quality of the recreational experience.

No Action. Under this alternative, the recreation areas, activities, and use at the restoration would remain the same.

Pilot Gravel Injection. The project would have no significant adverse effects on recreation in the project area. Public access to the proposed gravel injection site is limited with access through a locked gate. The lower Yuba River angling access program would not be offered while gravel injection activities are conducted.

3.8.3 Mitigation

Since there would be no significant adverse effects on recreation, no mitigation would be required.

3.9 Cultural Resources

3.9.1 Existing Conditions

The project area lies within the traditional boundaries of the Nisenan, or Southern Maidu people. The Nisenan language is part of the Penutian linguistic stock, a linguistic stock composed of Wintuan, Maiduan, Yokutsan, and Utian language families that constituted a continuous belt throughout Central California and the Sierra Nevada. The boundaries of the Nisenan territory were the Yuba, Bear, and American Rivers and the lower Feather River. On the west, the Nisenan territory was roughly bounded by the Sacramento River between the Feather and the American Rivers. To date, no archaeological surveys have located prehistoric sites within the project area.

The arrival of Euro-Americans in the 1820's began with the fur trapping expeditions. In the mid-1800's came the arrival of the Gold Rush miners, and agricultural pursuits

developed shortly thereafter. Hydraulic mining for gold in the region was extensive and quickly degraded agricultural resources when massive amounts of sediment from mine tailings were washed downstream. Eventually, hydraulic mining was halted, and debris dams such as Englebright and Daguerre Point Dam were constructed to control the continual downstream washing of sediment.

The Hallwood-Cordua Canal, located near the right abutment of Daguerre Point Dam, was constructed after WWI for agricultural irrigation (Corps 2001). The canal is unlined except for the concrete outlet near the dam. The outlet structure was reconstructed in 1964. Neither Daguerre Point Dam nor the Hallwood-Cordua Canal appears to meet the criteria for inclusion in the National Register of Historic Places due to numerous reconstructions. The Corps evaluated the historic status of Daguerre Point Dam and found that it did not meet the requirements for listing. However, a final determination by the State Historic Preservation Officer (SHPO) has not been made.

Archival research was conducted in 2004 by ENTRIX, a Corps consultant, at the California Historical Resources Information System, North Central Information Center, Sacramento, to locate all previously recorded sites situated within a 1/8-mile radius of the project area. This information was used to anticipate the type, quality, and number of archaeological sites that might be present in the area. In addition, a review of all previously conducted archaeological surveys for the area with 1/8-mile of the project area also was undertaken. This background review was conducted to bolster current research efforts and to address all potential effects to historical properties prior to initiation of the pilot gravel injection action.

This review resulted in the identification of four previously recorded archaeological sites (CA-YUB-144-H, CA-YUB-626-H, CA-YUB-669-H, and CA-YUB-736-H) located within 1/8-mile radius of the project area. Of these, site CA-YUB-669-H is situated adjacent to the project area. All of the remaining sites are within 500 feet of the project area (ENTRIX 2004).

The four previously identified sites are historic sites probably associated with Gold Rush Era placer mining in the area. In fact, CA-YUB-669-H is described by site recorders as a "site of small mining bar 1850-1860"; presumably Parks Bar (ENTRIX 2004). Site CA-YUB-144-H is an historic cemetery identified in an early historical account dated 1879; a tombstone within the cemetery can reportable be dated to 1849 (ENTRIX 2004). CA-YUB-626-H is the site of two medium sized water conveyance ditches measuring at least one-half mile in length, likely related to mining activities in area (ENTRIX 2004). The remaining site, CA-YUB-736-H, is another river placer site near Parks Bar designated as Fillmore Hill (ENTRIX 2004). None of the four sites are listed on or have been determined eligible for listing on the National Register of Historic Places. In addition, none of the sites are listed on the California Register of Historic Resources. No testing or further archaeological investigation has occurred at any of the sites.

At least four in-field reconnaissance level archaeological surveys have been conducted within and adjacent to the project area. Two of the surveys were conducted in the 1970's for

the Corps, Sacramento District, under contract with the California State University, Sacramento. The first, entitled "A Reconnaissance Archeological and Historical Site Survey of Selected Portions of the Parks Bar Lake Project Alternative, Marysville Lake Project," was reported in November 1974 and covered the entire project area. This survey initially located the four sites referred to in this section. The second survey, entitled "Cultural Resources of the Marysville Lake, California Project (Parks Bar Site), Yuba and Nevada Counties, California," was completed in August 1978. This survey covered the entire project area and re-visited the previously recorded sites. The third survey was conducted in 2002 by YCWA to analyze the effects of a proposal to install a full-flow bypass structure on the Narrows II hydropower facility adjacent to the gravel pilot placement site. The survey included the exterior of the power plant, the immediate surrounding area, and the locations that would be used for staging and spoils disposal. No cultural resources were identified at that time. It was determined that the steep slopes of the canyon made this location unsuitable for early historic or prehistoric occupation despite the area's proximity to the Yuba River (YCWA 2006).

On March 19, 2007, a fourth in-field reconnaissance level archaeological survey was conducted by a Corps' archaeologist within and adjacent to the project area. The area of potential effect was determined to be the lower Yuba River channel and the paved haul roads from the commercial gravel site to the base of Englebright Dam.

3.9.2 Effects

Basis of Significance. An alternative would be considered to have a significant adverse effect on cultural resources if it would diminish the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Types of effects include physical destruction, damage, or alteration; isolation or alteration of the character of the setting; introduction of elements that are out of character with the property; neglect; and transfer, lease, or sale of the property.

No Action. Under this alternative, there could be some effects to cultural resources. Natural processes such as erosion, root and rodent intrusion, and flooding could affect sites by exposing them to the elements and vandals.

Pilot Gravel Injection. In accordance with 36 CFR 800.3.a.1, the Corps determined that the project action has no known potential to cause effects to cultural or historic properties within the project area's APE. The haul roads are not historically significant, and there are no historic properties present in the lower Yuba River channel. There are additionally no cultural resources or historic properties identified within the project area's APE. Since this undertaking does not have the potential to cause effects on cultural resources or historic properties, the Corps has no further obligations under Section 106 of the National Historic Preservation Act of 1966. Should any prehistoric (arrowheads, mortar, or human bones) or historic artifacts (glass, ceramics, metal, or nails) be discovered during implementation of the proposed action, work activities would be stopped until mitigation is determined in consultation with the SHPO and Native American representatives. The proposed gravel injection site would not affect any of the three water diversion canals.

3.9.3 Mitigation

Since the pilot gravel injection would have no adverse effects on cultural resources or historic properties, no mitigation would be required.

4.0 GROWTH-INDUCING EFFECTS

An action agency must consider the indirect effects of a proposed action when preparing an EA. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate (40 CFR 1508.8(b)). The proposed pilot gravel injection would have no effect on population growth or densities. Growth in the project area would proceed as projected in the Yuba and Nevada Counties' general plans.

5.0 CUMULATIVE EFFECTS

The NEPA requires that an EA discuss project effects which, when combined with the effects of other projects, could result in significant cumulative effects. NEPA defines a cumulative effect as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7).

Currently, there are multiple planned and ongoing resource restoration projects within the Yuba River watershed with the goal of increasing and stabilizing anadromous fish populations. These projects include improved sediment management, fish screening alternatives at diversions, habitat improvement and restoration, and improved fish passage. The Lower Yuba River Technical Working Group is also supporting the development of a long-term restoration planning document to assist in prioritizing actions to complete restoration and enhancement of salmonid habitat.

The proposed action could contribute to the cumulative environmental effects of these planned and ongoing resource restoration projects within the Yuba River watershed. However, it is assumed that these projects have been or would be conducted in compliance with all applicable environmental laws and regulations, including implementation of mitigation measures.

The results of the proposed pilot gravel injection would be used to develop a long-term gravel augmentation program that would serve to improve the overall function of the habitat by providing spawning gravel to key areas on the lower Yuba River. As a result, the proposed pilot gravel injection would benefit, rather than adversely affect, the fluvial geomorphologic characteristics of the lower Yuba River by providing a better understanding of the geomorphic and ecological context of the system before implementation of a long-term gravel augmentation program. Restoration efforts (gravel augmentation) immediately downstream from Englebright Dam, where there is a net deficit of spawning sediment, may provide disproportionately important spawning habitat, which would result in a benefit to production of

the system (Moir 2006). Furthermore, the results of local studies by UCD indicate that specific restoration approaches must also consider the geomorphic regime of the system.

6.0 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

Clean Air Act of 1972, as amended, 42 U.S.C. 7401, et seq. Full Compliance. The Corps completed an analysis of air quality effects from the proposed action and determined that the estimated emissions and PM10 would not exceed Federal *de minimus* thresholds. The Corps has also determined that the proposed action would have no adverse effect on the future air quality of the project area. Therefore, no conformity determination would be required.

Clean Water Act of 1972, as amended, 33 U.S.C. 1251, et seq. Partial Compliance. The proposed action includes placement of materials in the waters of the U.S. Gravel injection may result in the temporary suspension of sediments at and immediately downstream of the proposed gravel injection site. A Section 404(b) (1) evaluation for the project determined that the appropriate and practicable discharge conditions to minimize pollution or adverse effects to the affected aquatic ecosystem include the requirement that the gravel arrive screened and pre-washed to the injection site from the commercial aggregate source. The Section 404(b)(1) evaluation is included as Appendix A, and a Section 401 water quality certification application for the CRWQCB is included in Appendix B.

Endangered Species Act of 1973, as amended, 16 U.S.C. 1531, et seq. Partial Compliance. A list of threatened and endangered species that may be affected by the project was obtained from the USFWS on August 8, 2006, and updated on February 23, 2007 (Appendix A). The Corps has determined that implementation of a pilot gravel injection project immediately below Englebright Dam (in order to satisfy the Terms and Conditions of the incidental take statement included in the BO dated April 27, 2007) would have no significant adverse effects on the listed Central Valley spring chinook salmon and Central Valley steelhead, nor would it likely destroy or adversely modify the designated critical habitat for these species. The Corps is currently seeking NMFS concurrence with that determination. The proposed action also contributes to the recovery of species listed under the ESA.

Executive Order 12989, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. Full Compliance. This Executive Order states that Federal agencies are responsible to conduct their programs, policies, and activities that substantially affect human health of the environment in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons from participation in, denying persons the benefits of, or subjecting persons to discrimination under such programs, policies, and activities because of their race, color, or national origin. The proposed action is in compliance with this Executive Order and would not affect any minority or low-income communities.

Farmland Protection Policy Act, 7 U.S.C. 4201 et seq. Full Compliance. This Act requires a Federal agency to consider the effects of its actions and programs on the Nation's farmlands. The proposed action would not result in the loss of any farmland.

Fish and Wildlife Coordination Act of 1958, as amended, 16 U.S.C. 661, et seq. Full Compliance. The USFWS has participated as an active member of the Yuba River Technical Working Group in evaluating the proposed pilot gravel injection project and the Corps has coordinated with USFWS as required under this Act.

Magnuson-Stevens Fishery Conservation and Management Act. Full Compliance. Chinook salmon species that may be affected by the proposed action are evaluated in this EA. The Corps has determined that the proposed pilot gravel injection project would have no significant adverse effects on these species, nor would it likely destroy or adversely modify the designated critical habitat for these species. This EA serves as the Corps Essential Fish Habitat Assessment for chinook salmon.

Migratory Bird Treaty Act of 1936, as amended, 16 U.S.C. 703 et seq. Full Compliance. The Migratory Bird Treaty Act implements various treaties and conventions between the United States, Canada, Japan, Mexico, and Russia, providing protection for migratory birds as defined in 16 U.S.C. 715j. The proposed action is in compliance with provisions of this Act.

National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321, et seq. Partial Compliance. After the public review period, a comment and response appendix will be prepared and included in the final EA.

National Historic Preservation Act of 1966, as amended. Full Compliance. Section 106 of this act requires a Federal agency to consider the effects of Federal undertakings on historical and archeological resources. The implementing regulation for Section 106 is 36 CFR Part 800 (revised 2004), "Protection of Historic Properties," which requires Federal agencies to initiate Section 106 consultation with the SHPO. On March 19, 2007, an in-field reconnaissance level archaeological survey was conducted within and adjacent to the project area. Since there are no cultural resources or historic properties identified within the project area's APE, this undertaking does not have the potential to cause effects on cultural resources or historic properties and the Corps has no further obligations under Section 106 of the National Historic Preservation Act of 1966.

Wild and Scenic Rivers Act, 16 U.S.C. 1271 et seq. Full Compliance. The purpose of the 'Wild and Scenic Rivers Act is to preserve and protect wild and scenic rivers and immediate environments for the benefit of present and future generations. The lower Yuba River has not been designated as a component of either the Federal and State Wild and Scenic Rivers systems.

7.0 COORDINATION AND REVIEW OF THE DRAFT EA

The draft EA will be circulated for 15 days to interested Federal, State, and local agencies; organizations; and the public. All comments received will be considered and incorporated into the final EA, as appropriate.

8.0 CONCLUSIONS

Based on this EA, the Corps has determined that the proposed pilot gravel injection project would not result in significant adverse effects on the environmental resources in the project area, including threatened and endangered species, and other wildlife and vegetation. Following the public review period, a determination will be made whether a FONSI is warranted or whether preparation of an EIS is necessary. A FONSI accompanies this draft EA.

9.0 LIST OF PREPARERS

Name/Expertise	Experience	Role
Mitch Stewart Biologist	6 years Environmental Manager, Corps	Report Preparation and Management
Sean Sweeney Biologist	1 year Environmental Manager, Corps	Report Preparation
Dan Bell Archeologist	5 years Archeology and Cultural Studies, Corps	Cultural Resources
Lynne Stevenson Biologist/Environmental Writer	21 yrs Planning and Environmental Studies, Corps	Review

10.0 REFERENCES

Alpers, Charles N. 2005. Upper Yuba River Studies Program – Water Quality Studies. U.S. Geological Survey. Upper Yuba River Studies Program Progress Report dated November 15 2005.

Beak Consultants, Inc. 1989. Water Temperature [SNTEMP] Modeling Evaluation of the Lower Yuba River. Final report of technical studies on the lower Yuba River, California (Yuba River Fisheries Investigations, 1986-1988). Prepared by Beak Consultants, Inc., Sacramento, California, and Thomas R. Payne & Associates, Arcata, California, for the California Department of Fish and Game, Sacramento, California.

California Air Resources Board (CARB). 2007. California Air Districts. Available at: www.arb.ca.gov/knowzone/basin/basin.swf

California Department of Conservation (CDC). 2007. Yuba County Important Farmland Data Availability. Available at: http://www.consrv.ca.gov/dlrp/FMMP/county_info_results.asp.

California Department of Fish and Game (CDFG). 1991a. Lower Yuba River Fisheries Management Plan. Steam Evaluation Report No. 91-1.

California Department of Fish and Game (CDFG). 1991b. Steelhead Restoration Plan for the American River.

California Department of Fish and Game (CDFG). 1998. A Status Review of the Spring-Run Chinook Salmon (Oncorhynchus tshawytscha) in the Sacramento River Drainage. Report to the Fish and Game Commission, Candidate Species Status Report 98-01.

California Department of Fish and Game (CDFG). 2000. Spring-Run Chinook Salmon. Annual Report prepared for the Fish and Game Commission. Habitat Conservation Division, Native Anadromous Fish and Watershed Branch.

California Department of Fish and Game (CDFG). 2002. Sacramento River Spring-run Chinook Salmon. 2001 Annual Report Prepared for the Fish and Game Commission. Habitat Conservation Division, Native Anadromous Fish and Watershed Branch. October 2002.

California Department of Fish and Game (CDFG). 2007. California Natural Diversity Database (CNDDB), Rarefind electronic database. Last Revised: March 3, 2007. Available at: www.dfg.ca.gov/bdb/html/rarefind.html.

California Department of Fish and Game (CDFG) unpublished field data and notes. Stream survey data, fish counts at Daguerre Point Dam, notes and photographs on file at DFG offices, Red Bluff, Sacramento and Rancho Cordova.

California Department of Water Resources (CDWR). 1997. Implications of the Delay at the Suisun Marsh Salinity Control Gates on Chinook Salmon Upstream Migrants. Environmental Services Office.

California Department of Water Resources (CDWR). 1999. Yuba Goldfields Fish Barrier Project. Preliminary Engineering Report.

California Department of Water Resources (CDWR). 2005a. Bulletin 250, Fish Passage Improvement. June 2005.

California Department of Water Resources (CDWR). 2005b. SP-F3.2, Task 3A: Sturgeon Distribution and Habitat Use: Addendum Including Other Fishes in the Lower Feather River. Preliminary Report. Oroville Facilities Relicensing, FERC Project No. 2100. August 22, 2005.

California Native Plant Society (CNPS). 2007. Inventory of Rare and Endangered Plants – 7th Edition. Last revised: January 17, 2007. Available at: www.cnps.web.aplus.net/cgi-bin/inv/inventory.cgi.

California Regional Water Quality Control Board (CRWQCB), Central Valley Region. 1998. Water Quality Control Plan (Basin Plan). Last revised: February 2007. Available at: www.swrcb.ca.gov/rwqcb5/available_documents/basin_plans/SacSJR.pdf.

Chiles, J.R., Snyder, N.P., Hampton, M.A. 2003. Bathymetric and geophysical surveys of Englebright Lake, Yuba-Nevada Counties, California. U.S. Geological Survey Open-File Report 03-383.

Clark GH. 1929. Sacramento-San Joaquin salmon (*Oncorhynchus tshawytscha*) fishery of California Division of Fish and Game. Fish Bulletin 17.

Cramer, S. P., and D. B. Demko. 1997. The Status of Late-Fall and Spring Chinook Salmon in the Sacramento River Basin Regarding the Endangered Species Act. Submitted to the National Marine Fisheries Service on behalf of the Association of California Water Agencies and California Urban Water Agencies.

ENTRIX. 2004. Draft Yuba River Gravel Augmentation Plan. Prepared for U.S. Army Corps of Engineers, Sacramento District. Sacramento, CA.

Feather River Air Quality Management District (FRAQMD). 2004. FRAQMD Area Designations for State and National Ambient Air Quality Standards. Available at: www.fraqmd.org/2004%20Area%20Designations.htm.

Fisher, F. W. 1994. Past and Present Status of Central Valley Chinook Salmon. *Conservation Biology* 8(3):870–873.

Hagwood, Joseph J. 1981. The California Debris Commission: A History. U.S. Army Corps of Engineers, Sacramento District. Sacramento, CA.

Kimball, Chris. 2003. Alternative Gravel Placement Methods. U.S. Department of the Interior, Bureau of Reclamation, Sacramento, CA.

Klasing, Susan Ph.D., Brodberg, Robert Ph.D. 2003. Evaluation of Potential Health Effects of Eating Fish from Selected Water Bodies in the Northern Sierra Nevada Foothills (Nevada, Placer, and Uba Counties): Guidelines for Sport Fish Consumption. California Environmental Protection Agency. December 2003.

May, Jason T., Hothem, Roger L., Alpers, Charles N., Law, Matthew A. 2000. Mercury Bioaccumulation in Fish in a Region Affected by Historic Gold Mining: The South Yuba River, Deer Creek, and Bear River Watersheds, California, 1999. U.S. Geological Survey Open File Report 00-367.

McEwan, D. and T. A. Jackson. 1996. Steelhead Restoration and Management Plan for California. California Department of Fish and Game.

Merz, Joseph E., Pasternack, Gregory B., Wheaton, Joseph M. 2006. Sediment budget for salmonid spawning habitat rehabilitation in a regulated river. *Geomorphology* 76 (2006) 207 – 228.

Moir, H. J., Pasternack, G. B. 2006. Implications of a Dynamic Hydromorphic Regime for Environmental Management on a Disturbed Large Gravel-bed River. EOS, Transactions of the American Geophysical Union 87(52), Fall Meet. Suppl., Abstract H41C-0425.

Moyle, P. B. 2002. *Inland Fishes of California*. 2nd edition. University of California Press. Davis, CA.

Mussetter Engineering, Inc. 2000. Letter report regarding geomorphological issues for the Daguerre Point Dam Fish Passage Study. Prepared for the U.S. Army Corps of Engineers.

National Marine Fisheries Service (NMFS). 1996. Factors For Steelhead Decline: A Supplement to the Notice of Determination for West Coast Steelhead Under the Endangered Species Act.

National Marine Fisheries Service (NMFS). 2002. Final Biological Opinion, Operations of Englebright Dam/Englebright Lake and Daguerre Point Dam on the Yuba River, California. Prepared for the U.S. Army Corps of Engineers. SWR-01-SA-6020:MET. March 27, 2002.

National Marine Fisheries Service (NMFS). 2005a. Green Sturgeon (*Acipenser medirostris*) Status Review Update. Update of the Status Review for North American Green Sturgeon (*Acipenser medirostris*)(Adams et al. 2002). Southwest Fisheries Science Center, Santa Cruz Laboratory. February 2005.

National Marine Fisheries Service (NMFS). 2005b. Final Biological and Conference Opinion, Yuba River Development Project License Amendment for FERC License No. 2246. Prepared for the Federal Energy Regulatory Commission. 151422SWR01SA5670:MET. November, 2005.

National Marine Fisheries Service (NMFS). 2007. Biological Opinion, Operations of Englebright Dam/Englebright Lake and Daguerre Point Dam on the Yuba River, California, for a 1-Year Period. Prepared for the U.S. Army Corps of Engineers. 15422-SWR-2006-SA00071:MET (PCTS # 2007/01232. April 27, 2007.

QUAD Consultants. 1994. Yuba County General Plan. Prepared for Yuba County, Department of Planning and Building Services, Marysville, CA.

Rich, A. A. 1997. Testimony of Alice A. Rich, Ph.D., Regarding Water Rights Applications for the Delta Wetlands Project, Proposed by Delta Wetlands Properties for Water Storage on Webb Tract, Bacon Island, Bouldin Island, and Holland Tract in Contra Costa and San Joaquin Counties. July 1997. California Department of Fish and Game Exhibit DFG-7. Submitted to State Water Resources Control Board.

State Water Resources Control Board (SWRCB). 2003. Revised Water Right Decision 1644 in the Matter of Fishery Resources and Water Right Issues of the Lower Yuba River.

U.S. Army Corps of Engineers (Corps). 1998. Yuba River Basin, California, Final Environmental Impact Statement/Environmental Impact Report. Sacramento District, Sacramento, CA.

U.S. Army Corps of Engineers (Corps). 2001. Daguerre Point Dam, Yuba River, California. Preliminary Fish Passage Improvement Study. Sacramento District, Sacramento, CA.

U.S. Fish and Wildlife Service (USFWS). 1993. Abundance and Survival of Juvenile Chinook Salmon in the Sacramento–San Joaquin Estuary. (1992 Annual Progress Report.) Stockton, CA.

U.S. Fish and Wildlife Service (USFWS). 2007. Species Lists for Smartville and Browns Valley U.S. Geological Survey 7.5 Minute Quads. Available at: www.fws.gov/sacramento/es/ssp_lists.

U.S. Geological Survey (USGS). 2002a. Water Quality Assessment of the Sacramento River Basin, California: Water – Quality, Sediment and Tissue Chemistry, and Biological Data, 1995 – 1998: Yuba River at Marysville, California, Field measurements, total hardness, and suspended sediment.

U.S. Geological Survey (USGS). 2002b. Water Quality Assessment of the Sacramento River Basin, California: Water – Quality, Sediment and Tissue Chemistry, and Biological Data, 1995 – 1998: Yuba River at Marysville, California, Nutrients and organic carbon in filtered and unfiltered water.

Western Regional Climate Center (WRCC). 2005. Last Revised: April 14, 2005. Available at: www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca3800.

Yoshiyama, R. M., F. W. Fisher, P. B. Moyle. 1998. Historical Abundance and Decline of Chinook Salmon in the Central Valley Region of California. North American Journal of Fisheries Management 18:487–521.

Yuba County Department of Agriculture (Yuba County). 2007. Yuba County Agricultural Crop Report for 2006. Letter report submitted to California Department of Food and Agriculture, and the Yuba County Chamber of Commerce. Available at: http://www.co.yuba.ca.us/Departments/Ag/documents/Yuba_Crop_Report_06.pdf

Yuba County Water Agency (YCWA). 2002. Active Water Contracts. Available at: www.ycwa.co/awc.htm.

Yuba County Water Agency (YCWA). 2006. Environmental Analysis for the Proposed Yuba County Water Agency One-year Water Transfer to the California Department of Water Resources and 2007 Pilot Program, Lower Yuba River Accord Fisheries Agreement. Prepared by HDR and Surface Water Resources, Inc. October 2006.

Plates

Appendix A

Section 404(b)(1) Evaluation

Appendix B

State 401 Water Quality Certification Application

Appendix C

USFWS Species List

Appendix D

Special-Status Fish, Wildife, and Plant Species that may Occur in the Project Area